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A MONOGRAPH

OF THE

CRAG MOLLUSCA,

WITH

DESCRIPTION OF SHELLS

FROM THE

UPPER TERTIARIES OF THE BRITISH ISLES.

BY

SEARLES V. WOOD, F.G.S.

VOL. II.

BIVALVES.

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NOTE

TO

THE CRAG MOLLUSCA.

In the Appendix to the 'Crag Mollusca,' p. 323, is the notice of a fossil which I have there assigned, with doubt, to the Genus Aplysia, conceiving it to have been the calcareous portion of an internal shell; and as it is important that errors of this kind should not remain uncorrected, I take the earliest opportunity of making the correction. In the living Aplysia there is a shell or shield situated on the back of the animal, encysted in the mantle, covering the branchial region; and although this internal shell in the recent state is thin and coriaceous, I thought it possible there might be sufficient calcareous matter in the shell of some species of that genus to permit its being preserved in a fossil state. In this I have been mistaken. Considerable doubt was entertained by me at the time of publication, but it was my desire to have everything figured that appeared to be in any way connected with the Mollusca of the Crag.

In the course of my examination of the Eocene Bivalves, now preparing for publication, my attention has been directed to the Genus Anomia, and I find there that the right or under valve is sometimes so small as almost to be obsolete or useless as a protection to the living animal, the diameter of the upper valve being in some instances three times that of the lower, and the construction of this latter is often so thin and fragile as to permit the greater part of it to be easily destroyed. From the umbonal region of this valve, proceeding towards the larger side in the interior of the shell, are two thickened ridges, one forming the dorsal margin and the other extending downwards to the body of the shell immediately on the hinder edge of the foramen, which gives a strength and protection to this part of the valve over the

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other, and this is the state and condition of the specimens of my little Crag fossil, the correct position of which I had been unable to determine; the figure, therefore (fig. 24, Pl. XXXI) will serve as an illustration of the under valve of what probably was the young state of the Crag *A. ephippium*.

There is every reason to believe that the Genus Aplysia existed during the Tertiary Period, but as yet it appears we have no well-attested specimens of their remains having been preserved in a fossil state.

S. V. WOOD.

May, 1860.

LIBRARY OF THE UNIVERSITY OF CALIFORNIA

A MONOGRAPH

OF THE

MOLLUSCA FROM THE CRAG.

BIVALVIA, *Linnæus*, 1767.

BIVALVIA. *Bonanni*, 1681. *Lister*, 1686. *Flem.* 1828.
DITHYRA. *Arist. Turt.* 1822. *Swains.* 1840.
DITOMA. *Tournefort*, 1742.
ACEPHALA TESTACEA (part). *Cuv.* 1789.
LAMELLIBRANCHIATA. *De Blainv.* 1814.
CONCHIFERA (part). *Lam.* 1818.
CONCHÆ. *Leach.* 1819.
PELECYPODA. *Goldfuss*, 1820.
ENDOCEPHALA (part). *Lat.* 1825.
ELATOBRANCHIA. *Menke*, 1830.
CORMOPODA. *Burm.* fide *Herrm.*

ANIMALS of this Division of the Linnean Testacea have no proper head, their most vital parts are enveloped in a mantle, or pallium, as it is called, which surrounds them on all sides; the edges of this mantle are sometimes plain, at others fringed, and are more or less united: what is called the foot, is generally a large and powerful muscular mass, capable, in some species, of being protruded beyond the shell to a considerable distance. The respiratory organs, or *branchiæ*, are usually four in number, and are arranged in the form of ruffles enveloping the abdominal mass, but entirely included within the mantle; in some few of the species, the number of these feathery appendages is less, while in others there are more, than four. The animal is protected by two portions of shelly matter called valves, these are secreted by and formed upon the mantle, and are articulated together by a cartilage and ligament, by which the two pieces are held in position, and move, as it were, like a door upon its hinge, or rather

like the two covers of a book, this is furthermore often strengthened by prominences and depressions in a part of the shell kept thickened for the purpose, interlocking each other, preventing, in most instances, the possibility of any material inconvenience arising from lateral motion without a fracture. The common action of the valves in their separation or opening is from the relaxation of the adductor muscles, when from the natural elasticity of the ligament the valves are drawn apart, and again closed by the contraction of the muscle or muscles that pass from one valve to the other, strongly adhering to the inner surface of the shell on which, in most cases, a distinct, and often a deep indentation is left.

The muscular fibres by which the edges of the mantle are withdrawn adhere to, and leave a linear impression somewhat within the margin of the shell; and, in some of the Bivalvia, at the posterior side of the animal, are two siphonal tubes, formed by the prolonged portions of the mantle, the lower one is called the inhalent, the upper one the exhalent siphon, these tubes are capable of being protruded by the animal with the assistance of muscles for that purpose, and again withdrawn under the protection of the shell. In animals possessed of these tubes, the withdrawal of them is indicated in an impression on the body of the shell by the retractor muscle, leaving what is called a siphonal scar, or palleal sinus, which generally denotes, by its depth, a corresponding proportion in the length of the tubes; and where the muscular fibres of the mantle adhere to the interior, leaving the impression without an inflection, the animal either has no prolongation of the mantle, or that the tubes are so short as scarcely to be capable of extension beyond the margin of the valves, and the impression in that case formed by the mantle is parallel, or nearly so, to the outer edge of the shell.

These marks, therefore, are of essential service to the Palæontologist, as they afford the only indications of the form possessed by the animal inhabitant, thus impressed upon the interior of the valves. It is however to be feared, that a perfectly strict reliance cannot always be placed upon the peculiar magnitude of this siphonal scar, even in specific determination, as a marked deviation from what might otherwise be considered its typical form may occasionally be detected, but it is in those species which are most subject to variation in the outward forms of the shell; as a general rule, this line, when visible, is of the greatest assistance, and at all times a good auxiliary character in the determination of a species. The length of the siphonal tubes, or the consequent indenture or sinuation of the mantle mark in the shell, points out a difference in the animal from those in which the sinus is wanting, or at least nearly so, where it indicates a mantle either without or with very short siphons, giving fair grounds for generic separation; but occasionally, species are met with that are otherwise very closely allied, having a similar dentition, and bear the same general relationship in regard to the shell, although very unlike in the form of the mantle-mark, such as *Leda* and *Nucula*, *Cardium* and *Adacna*, *Lucina* and *Lucinopsis*, and cannot, without violence to a natural arrangement, be removed to any distant position,

merely, in consequence of a difference in the length of the tubes or depth of the sinus.*

Some Malacologists seem disposed almost entirely to reject the shell, as unworthy of consideration in a Zoological arrangement, viewing it in the light of an inert or inorganic mass, unconnected with the animal, or at least merely formed by and used as a protection to its more vital parts, and have based their superstructure upon the mantle itself, and upon the difference in length of its siphonal tubes. In the 'History of British Animals,' by Dr. Fleming, published in 1828, the Bivalvia were separated into two sections, called SIPHONIDA and ASIPHONIDA, a division subsequently adopted by some continental authors under the denominations SINUPALEALIA and INTEGROPALEALIA, as founded upon a portion of the animal more highly organised than its dermal covering, and, consequently, supposed to give a more scientific basis to its classification. Investigations by the microscope have shown a high degree of organisation, and the possession of a considerable amount of vitality in the shell, essential to the existence, depending upon, and modified by the exigencies of the animal; and in this outer coating of the mantle there is preserved a relationship apparently more constant than is exhibited by its fleshy interior; and whatever other organs, in the more vital parts may be supposed to furnish a basis for Ordinal division, it is very doubtful if the form of the mantle alone will be sufficient.

The number and position of those parts of the hinge called teeth are essential distinctions, as there is a permanence of form in the dentition of all genera, although, in a few instances, these characters which are prominent and distinctive in some species, will be diminished and become nearly obsolete in others; but they do not vary in form or position in the same genus.† That portion of the hinge called the *ligament*, performs an important office in the animal economy, as it is by this the valves are bound together, and kept in their true position. This uniting and elastic substance is called *cartilage*, when it is placed within the edges of the valves, and is consequently compressed when they are closed, and by its tendency to expand at the relaxation of the adductor muscle or muscles, assists in the separation of the shells at the ventral margins: that portion which is external, is called *ligament*, and is generally placed on a prominent fulcrum, or projecting portion of the shell, and by its elasticity or contraction draws back and opens the valves when the opposing power of the adductors is relaxed; although this substance is of a cartilaginous nature, and contains but a small portion of lime, and is consequently not often preserved in a fossil state, its position is always indicated where it has been, either by a pit or depression for its reception, or by the fulcrum to which it was attached. In the smaller portion of the Bivalvia, the animal is furnished with only one adductor muscle, and constitutes

* Great differences also exist between the mantles of some of the members of the Leptonidæ.

† There is a slight exception to this rule in the hinge of the Polyodonts, *Leda*, *Pectunculus*, *&c.*, where the *number* of teeth will vary, even in individuals of the same species at different periods of existence, but their general character is not altered.

that division or section called *Monomyaria*, or *Unimusculosa*, by some authors. In this, the muscle is placed in the centre, or nearly so, and is generally large and powerful, adhering strongly to the interior, leaving often a deep indentation which is sometimes of a different colour to the rest of the shell; the form of this muscle mark is variable in different genera, but is not of much assistance in specific determination. Some of these have the hinge ligament on the exterior, like the Oyster, &c., where it acts by contraction and elongation; in others, Pecten, &c., its action is by expansion and compression; in this group, the edges of the mantle are generally disunited and not prolonged into siphons, and the impression formed by its muscles within the shell, is without any inflection, and parallel to the margins of the valves. In the much larger portion, called *Dimyaria*, or *Bimusculosa*, the animal has two distinct adductor muscles, one of which is situated near the anterior margin, while the other occupies generally a corresponding position on the posterior side.

As these muscular impressions are relatively situated in the same position, and always of the same form, a great alteration takes place during the growth of the animal by a gradual progression, as it increases in size and the shell enlarges; the successive advancement of these impressions is indicated in many species by distinct lines of growth: and as this enlargement necessarily increases outwardly, the animal possesses the power of making fresh additions to the exterior portion of the muscle, while at the interior part, the now becoming useless or inconvenient portion, is detached from its former place of adherence, and absorbed by the animal; while in most species, a fresh layer of calcareous matter, secreted from the whole surface of the mantle, is deposited upon the interior of the shell, and covering the deserted portion of the muscle mark, leaving untouched that part only against which is attached its powerful adductor. In the Oyster, more especially, these successive layers are distinctly visible, showing the enlargment of the shell by the extension of the mantle in the lines of growth upon the exterior, as also by the generally rugose or lineated surface of the ligamental area. The same may be said of the dental characters of the shell which are always relatively placed in regard to the specimen, whether in the young or in the adult; and the alteration, therefore, of their position in the growth of the shell, can only be effected by the removal of one part, while fresh deposition is formed on the other, unless the whole be sufficiently organised to partake of the varying changes of the animal itself: a question as yet not satisfactorily determined.

Dr. Carpenter gives in his 'Report on the Microscopic Structure of Shells,' as the true history of the *Conchiferous Acephala*, the following account:—"The *margin* only of the mantle has the power of giving origin to the *outer* layer of the shell, while the *whole surface* may generate the *inner*. Every new production of shell consists of an entire lamina of the latter substance, which lines the whole interior of the old valve, and of a broader margin of the former which thickens its edge. So long as the animal continues to increase in dimensions, each new exterior layer of shell projects so

far beyond the preceding, that the new border composed of the outer layer, is simply joined on to the margin of the former one, so that the successive formations of the outer layer scarcely underlie each other. But when the animal has arrived at its full growth, the new laminæ cease to project beyond the old, and as each is composed of a marginal band of the external substance attached to the edge of an entire lamina of the inner, these bands must now underlie each other, being either quite free as in Ostrea, or closely united to each other as in Unio, and most other Bivalves; and the additions to the shells of the Gasteropoda are made upon the same plan, although it has commonly been supposed that they are only attached to the edge of the old shell, instead of being continued over its entire surface."

The figure and size of the foot materially influences the form of the anterior part of the shell, while the posterior depends upon the modification of the siphons. The degree of development of the nervous system is said to be very variable in these animals, and the organs of sense dependant thereon variously distributed, imperfect organs of sight are present in some species, and rudimentary organs of hearing have been detected in others, and are possibly present in all: while in some, the sexes are separate and distinct, in others they are united or hermaphrodite, microscopic animals and plants constitute their principal food.

Species of this class have been found in the seas of every clime, and inhabit the waters of all depths, some few are left dry by the retiring tide, while others frequent the bottom of seas, to the depth of 200 fathoms; and the vertical range of many species is so extensive, as to render doubtful the allocation of strata from the presence of a few fossil forms, with whose habits we are but indifferently acquainted; moreover, the habits of all recent species are not, perhaps, necessarily the same as those of their prototypes that lived in times long past, and probably, under different conditions.

The authors of the beautiful work upon the 'British Mollusca,' now in the course of publication, have given many interesting details respecting the range in depth at which most of these animals have been obtained, and occasionally, the nature of the ground they had selected for their habitation; the generality of species prefer clear water and a sandy bottom, but others are frequenters of mud. The bottoms of the Crag Seas, judging from the deposits now remaining upon the Eastern Coasts of England, appear to have been principally of sand or gravel, with comminuted fragments of shells; that of the Coralline Crag Sea being generally fine in its particles, formed at a depth varying, perhaps, from 20 to as much as 40 fathoms, if the habits of the then existing animals were the same as their homologues of the present day. The Red Crag Sea appears to have been subject to greater agitation, and was probably less in depth, while much of its bottom was of a gravelly character, or of coarser sand. The deposits of the Mammaliferous Crag Period present us with characters rather more variable; that which is found near Norwich, being what is called Fluvio-marine, formed probably, in a shallow estuary, and composed of sand, gravel, and shells,

while the Bridlington bed was more purely marine, with a bottom apparently of sandy mud, similar to what is exhibited by the newly discovered tranquil deposit resting upon the Red Crag at Chillesford, where the water may have been of some considerable depth.

In estimating the dimensions of the shell in the following descriptions, the proportions are given only as an approximation; in most species, these are more or less variable. The length is taken from the anterior edge of the shell to the outermost portion of the posterior side, that being considered as anterior where the foot is protruded, while the position of the ligament and the siphonal tubes, where they exist or their presence shown in the shell by the sinuated form of the pallial impression, is on the posterior side. Presuming, therefore, the animal to move with the foot foremost, it will have its dorsal or hinge-part of the shell uppermost, and the diameter from the umbo to the ventral margin is called its height, while the depth is measured from the most tumid part of one valve to the corresponding place in the other.

Anomia.* *Linn.* 1767.

Anomia. *Müller.* 1776.
Glycimeris. *Browne,* 1756.
Lampades (sp.). *Gevers.* 1787, fide *Gray.*
Fenestella. *Bolton.* 1798, fide *Herrmansen.*
Echion and Echioderma. *Poli.* 1791.
Cepa. *Humphries,* 1797.
Anomya. *Agass.* 1839.

Generic Character. Shell irregular, inequivalved, subequilateral, ovate or suborbicular, and fixed: lower or inferior valve more or less flattened, with a large foramen or perforation, through which passes a bony or calcareous appendage for the attachment of the animal; upper valve, convex smooth or irregularly laminated, sometimes striated, costated or muricated, often assimilating the body of the shell to that on which it is fixed; one muscular impression in the lower or fixed valve, with three in the upper or convex one; ligament internal, placed a little within the umbo of the upper or larger valve, in a somewhat triangular pit, with a projection near the edge of the foramen in the opposite valve, to which it is attached; hinge without teeth.

The animal of this genus, is said to have the edges of the mantle disconnected, the margins bearing a double fringe of short scirrhous appendages, without ocelli or rudimentary eyes. No siphonal tubes, and foot very small, nearly obsolete. The adductor muscle is divided into three parts, making three distinct impressions on the

* Etym. 'Ανόμοιος, unlike or unequal.

upper, while one only is formed upon the lower valve, the other two passing into the calcareous operculum by which it is fixed. Sexes distinct.

As the individuals of this genus are always attached, they are seldom of a regular form, but generally more or less distorted, modified by, and often assuming the shape and characters of the body to which they adhere; and as they are frequently attached to the shells of the Pecten, an individual of this genus, which in its natural state is nearly smooth, will become, in consequence, rayed or pectinated, partaking of the characters of the body it has been living upon. If, therefore, it be attached near the umbo of the Pecten, its regular increase will assume the form of that genus; but if its attachment be upon the wider rays, these ribs will not represent the regular form, but the impress of its place of attachment will be shown, as in fig. 3 *b*, in parallel or nearly parallel ridges across the shell. In order to produce this appearance, the addition that is made by the mantle to the edges of the shell are carried over the ribs of the Pecten down into the interspaces, by which means a costated form is given to a shell, otherwise smooth. This character, however, according to Mr. Clark, appears to be eclectic, or at the will of the animal. Thus, whenever the under or lower valve has its edges elevated above the ribs of the Pecten, so as not to be influenced by those inequalities, then the upper valve retains its original form. The lower valve is generally thin, often papyraceous, so that in the fossil state, the upper valve is the most numerous.

The Anomia is closely allied to the Pectens, and the perforation in the lower valve, is said by the authors of the 'Hist. of Brit. Mollusca,' to be chiefly a greater extension of the auricular sinus of that genus; and that the young fry will be probably found attached by means of a byssus, which as the animal increases, eventually becomes converted or transformed into the calcareous opercular process of the older shell, this organ of attachment being merely the extension and indurated portion of the lower part of the adductor.

A large number of detached valves are found in the Coralline Crag, but their specific appropriation is a matter of great difficulty from their excessive variability of form, as well as great irregularity in their external ornament; and as their correct assignment, even in a recent state, with "all appliances and means to boot" by the aid of their animal inhabitant, as well as by assistance given in the colouring matter of the shell, is still a doubtful matter, the appropriation of the fossil species may be looked upon with suspicion.

Mr. Clark in the examination of this genus, has arrived at the conclusion, that there is but one species now found in the British Seas; and that the extraordinary variation both in form and sculpture, exhibited by individuals, is so fluctuating in character, as not to be depended upon for specific distinction. As, however, there are generally some marked differences in these shells by which the variations may be separated, I have followed the authors of 'British Mollusca,' in considering them for the present so many distinct species.

This genus is found in the Secondary Rocks; one species has been described by Mr. Bean, from the Cornbrash; 'Mag. Nat. Hist.' 1839. And some from the Greensand by Dr. Fitton.

1. ANOMIA EPHIPIUM, *Linnæus.* Tab. I, fig. 3, *a—d.*

ANOMIA EPHIPPIUM. *Linn.* Syst. Nat. ed. 12, p. 1150, No. 218, 1767.
— SQUAMULA. *Id.* - - - p. 1151, No. 221.
— — *Turt.* Brit. Biv. p. 229, pl. 18, fig. 5-7, 1822.
— — *Broc.* Conch. Foss. Subap., p. 461, 1814.
— — *Dekay.* Nat. Hist. New York (Zool.), p. 168, pl. 12, fig. 209, 1843.
— — *Middendorff.* Malacozoologia Rossica (Mem. de l'Acad. des Sc. Imp· de St. Petersb.), p. 519, t. 11, fig. 18-21, 1849.
— SULCATA. *Poli.* Test. Sic. vol. ii, p. 186, t. 30, fig. 12.
— MARGARITACEA. *Id.* - - t. 30, fig. 11.
— CŒPA. *Id.* - - - t. 36, figs. 1, 25-8.
— LENS? *Goldf.* Pet. vol. ii, p. 40, t. 88, fig. 8, *a—e.*
— EPHIPPIUM. *S. Wood.* Catalogue, 1840.
— COSTATA. *Broc.* Conch. Foss. Subap., p. 463, t. 10, fig. 9, 1814.
— RADIATA? *Id.* - - - - t. 10, fig. 10.
— SULCATA? *Id.* - - - - t. 10, fig. 12.

Spec. Char. Testâ polymorphâ, crassâ vel tenui, plerumque lavigatâ, formâ valdè irregulari.

Shell many shaped, thick and strong, sometimes thin and fragile, generally smooth, form very irregular.

Diameter, $\frac{3}{4}$ths of an inch.

Locality, Cor. Crag, Sutton, Sudbourn.

Recent, Mediterranean, Britain, Scandinavia, North America.

The variety of this species, called *squamula,* is exceeding abundant in the Coralline Crag, and like the recent shell, is subject to great distortion, depending upon the body to which it has been attached; a large number of these specimens have taken the characters of the genus Pecten, to which, in the living state they were attached, but it is only in the upper or free valve that I have been able to observe the costated form, the lower or adherent one was probably much thinner, and less capable of preservation.

A few specimens of the lower or perforated valve are occasionally met with, and in all that I have seen, the valve is externally smooth, at least, free from striæ or costæ, and its place of attachment was some smooth or even surface. This variety does not appear to have attained the size of more than $\frac{3}{4}$ths of an inch in diameter, and the majority of specimens have not reached above half those dimensions. In those which have the upper valve quite flat and smooth, the place of attachment was probably the interior of some shell, from which the lower valve would take the convex form, giving room between the two for the occupation of its inhabitant. The beak or umbo of this species, is almost immediately at the margin or projecting a little beyond it.

The variety called *cylindrica* or *cymbiformus* (fig. 3, *c*), is also occasionally found in the Coralline Crag, though by no means abundantly. It has been determined by British Conchologists, that this form is produced from its place of adherence being the stem of the seaweed, or some such cylindrical body,* while the variety *fornicata* is said to be merely a deformity from some similar cause; this I have not yet seen in the fossil state. The exterior of some of the Crag specimens indicate their place of rest to have been upon a *Bryozoon*, the shell being prettily and distinctly marked by that animal.

Some idea may be formed of the Protean character of this species, as no less than eighteen different specific names are introduced by the authors of the 'Hist. of Brit. Moll.' into their synonyma, while these, with several others by them, considered as distinct, are included as mere varieties by Mr. Clark.

2. ANOMIA ACULEATA, *Müller*. Tab. I, fig. 2, *a*—*b*.

ANOMIA	ACULEATA.	*Müll.* Zool. Dan. Prod., p. 249, 1766.
—	—	*Mont.* Test. Brit., p. 157, pl. 4, fig. 5, 1803.
—	—	*Brown.* Brit. Conch. Illust., pl. 34, fig. 6, 1827.
—	—	*S. Wood.* Catalogue, 1840.
—	—	*Gould.* Invert. Massach., p. 139, fig. 90, 1841.
—	—	*Philippi.* En. Moll. Sc., vol. ii, p. 214, t. 28, fig. 1, 1841.
—	—	*Thorpe.* Brit. Mar. Conch., p. 123, fig. 73, 1844.
—	—	*Loven.* Ind. Moll. Scand., p. 30.
—	—	*Dekay.* Nat. Hist. New York (Zool.), p. 168, pl. 12, fig. 210.
—	STRIOLATA.	*Turt.* Brit. Biv., p. 233, 1822.
—	—	*W. Wood.* Ind. Test., p. 54, pl. 11, fig. 7, 1825.
—	—	*Flem.* Brit. An., p. 396, 1828.
—	—	*Thorpe.* Brit. Mar. Conch., p. 123, 1844.

Spec. Char. Testâ suborbiculari vel ovatâ; striatâ, striis plurimum numerosis, radiantibus, squamoso-aculeatis; umbone submarginali, lævi.

Shell suborbicular or ovate; striated, striæ generally numerous, with fine elevated or squamose prominences, rendering the surface rough or prickly; umbo, submarginal, and smooth.

Diameter, ½ an inch.

Locality. Cor. Crag, Sutton, and Ramsholt.

Recent, Mediterranean, Britain, Scandinavia, and North America.

This species, called the prickly Anomia, is very abundant in the Coralline Crag at Sutton, whence all my numerous specimens were obtained. I have not yet seen it from the newer formations. It closely resembles the young of the preceding in most

* This, however, was not the position of our shell, which is the upper or imperforate valve, and is quite flat, the lower or adherent one, was probably convex externally, and fixed to the *interior* of some cylindrical body, and to which our specimen must have acted as a lid.

of its characters, but may be distinguished, if not specifically, certainly as a variety, by its sculpture, which is in the form of spinous or squamose radiations. In the recent state, the lower or perforated valve, is said to be generally thin and fragile, and destitute of the aculeated striæ. As the shells found in the Crag are separated or detached, they would not be recognised, if this were always the case; but many of the lower valves are alike ornamented with these markings, though they are less conspicuously so than upon the upper ones. The umbo of this is placed very near the margin, and is generally slightly recurved; the striæ are numerous, although in some specimens they are more distant; but in all they have more or less, the vaulted or raised, and slightly reflected edges, which as it grows produce the series of aculeated or fimbriated striæ upon the exterior, though very faintly exhibited in the variety called *striolata*. In the very young of some of my specimens, the shell appears to be free from sculpture of any kind, and this may favour the opinion of Mr. Clark.

3. ANOMIA PATELLIFORMIS, *Linnæus*. Tab. I, fig. 4, *a*—*b*.

ANOMIA PATELLIFORMIS. *Linn.* Nov. Act. Upsal., vol. i, p. 42, pl. 5, figs. 6, 7, 1773.
— — *Loven.* Ind. Moll. Scandin., p. 30, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 75, 1848.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 334, pl. 56, figs. 5, 6, 1849.
— — *Middendorff.* Malac. Ross. (Mem. de l'Acad. des Sc. St. Petersb.), p. 521, 1849.
— UNDULATIM STRIATA. *Chem.* Conch. Cab., t. viii, p. 88, tab. 77, fig. 699.
— UNDULATA. *Gmel.* Syst. Nat., p. 33, 46.
— — *Mont.* Test. Brit., p. 157, pl. 4, fig. 6, 1803.
— — *Turt.* Brit. Biv., p. 230, pl. 18, figs. 8, 9, 10, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 34, figs. 2, 3, 1827.
— — *Flem.* Brit. An., p. 395, 1828.
— — *S. Wood.* Catalogue, 1840.
OSTREUM STRIATUM. *Dacosta.* Brit. Conch., p. 162, pl. 11, fig. 4.
OSTREA STRIATA. *Donov.* Brit. Shells, vol. ii, tab. 45, 1801.
— — *Mont.* Test. Brit., pp. 153, 580, 1803.
— — *List.* Hist. Conch., fig. 36.
Ency. Meth., pl. 171, fig. 16, and pl. 184, figs. 5, 6.

Spec. Char. Testâ suborbiculari, plicis 20—30 *convexis, undulati-radiatis; striis concentricis crebris, sublaminaceis; umbone subprominulo à margine remotiusculo.*

Shell suborbicular, ornamented with 20—30 radiating and undulating ribs; concentric striæ or lines of growth thick and sublaminated; umbo slightly prominent, a little distant from the margin.

Diameter, 1½ inch.

Locality. Cor. Crag, Sudbourn and Sutton.
Red Crag, Sutton, Bawdsey, Walton Naze.
Recent, Britain and Scandinavia.

A few specimens resembling the figure, and corresponding with the description of what the authors of 'Brit. Moll.' have considered as distinct, are in my cabinet, from the Coralline Crag: they consist of the upper valve only, which is somewhat finely striated over the earlier formed part of the shell, while the latter or outer portion is covered with larger and coarser radiations. The umbo is rather more prominent, and placed at a greater distance from the margin than in *Ephippium*, a broad triangular fossette beneath the umbo received the ligament, and the upper valve in my Cor. Crag specimens is nearly flat. A number of specimens of the upper valve, from the Red Crag, present characters by which they may be referred to the above recent species, and are uniform in their exterior markings, having large and undulating ribs or broad and elevated striæ (fig. 4, *a*). This is the only species or variety, that I have been able to obtain from the Red Crag, and those specimens, as might be expected, in that deposit, consist of the upper or thicker valve only; this is pretty uniform in shape, which is nearly orbicular, though the diameter in some is greater from the umbo to the ventral margin, in others it is the reverse.

4. ANOMIA STRIATA? *Brocchi*, Tab. II, fig. 3.

SQUAMA MAGNA? *Chem.* Conch. Cab., t. viii, p. 87, pl. 77, fig. 697.
ANOMIA STRIATA? *Broc.* Conch. Foss. Subap., p. 471, t. 10, fig. 13, 1814.
— — ? *Loven.* Ind. Moll. Scand., p. 29.
— — ? *Goldf.* Pet. Germ., t. ii, p. 39, tav. 88, fig. 4, *a—c.*
— — *Phil.* En. Moll. Sic., vol. ii, p. 66, 1844.
— — ? *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 336, pl. 55, figs. 1, 6, and pl. 53, fig. 6, 1849.
— RUGOSA. *Nyst.* Coq. Foss. de Belg., p. 312, pl. 24, fig. 6, 1844.
— SQUAMA? *W. Wood.* Ind. Test., p. 55, pl. 11, fig. 11, 1825.
— — ? *Brocchi.* Conch. Foss. Subap., p. 462, No. 4, 1817.
? Ency. Meth., pl. 171, fig. 22.

Spec. Char. Testâ variabile, orbiculata, vel transversè ovatâ, discoideâ, radiatâ; striis creberrimis, imbricato-squamulatis; umbone submarginali.

Shell variable, ovate, orbicular or discoidal; sometimes transversely ovate, covered with numerous radiating, rather rough or imbricated striæ; umbo submarginal.

Diameter, 2 inches.

Locality. Cor. Crag, Sutton, Sudbourn, and Gedgrave.

Recent, Britain and Scandinavia.

A large number of loose valves in my cabinet, from the Coralline Crag, correspond with the figures and description as given of the recent shell under this name, which is, probably, the same as the fossil one figured by Brocchi, although that shell appears to have the umbo rather nearer to the margin. Ours may be described as variable in form, the upper valve sometimes flat, in others convex, covered over with numerous subimbricated striæ, with the umbo a little distant from the edge.

Anomia striata, J. Sow., Min. Conch., t. 425, differs from our shell, in having more numerous and much finer striæ without the roughness of the Crag specimens, and is in all probability distinct; the umbo of the Eocene shell extends to the edge, or very nearly so, and was, probably, not so thick in substance.

These, as before remarked, have been separated into different species by recent Conchologists, but their correct specific distinction cannot be expected in fossils, when the recent forms are so perplexing as to defy determination, or at least to produce great diversity of opinion; it is, therefore, only attempted with the Crag species, to assign them to what is believed to be identity of form or correspondence with those shells which are found in recent seas.

Ostrea, *Linn.* 1758.*

Ostrea. *Lister*, 1686.
Ostræa. *Defrance. Swains. Reeve* and *Catlow.*
Ostreum. *Rumph.* 1705. *Adanson*, 1757.
Mya. *Scopoli*, 1777.
Peloris and Peloriderma. *Poli.* 1791.
Dendostræa. *Swains.* 1840.

Gen. Char. Shell attached by a part of the larger or lower valve, generally thick and strong, lamellated or foliated, variously shaped, irregular, inequivalved, inequilateral; upper or free valve flat or slightly concave; under or adherent one convex, sometimes strongly marked with radiating, lamellated costæ; hinge without teeth, ligament lodged in a linear depression in each valve semiexternal. Impression of the adductor muscle, large subcentral, that by the mantle entire, generally indistinct, and ill defined.

The animal has the mantle disunited on all sides, with its edges bordered by short tentacular fringes; foot obsolete. Sexes distinct.

The shells of this genus have only one muscular impression, which is always a little inclined to the posterior side. These animals fix themselves by the exterior of the left valve, and the space upon the shell denoting the place of adherence is exceedingly variable in size, depending, probably, upon external causes; in some individuals, the greater part of the entire surface is employed, while in others, this place of attachment is scarcely to be discerned, and occupies only a small portion of the pointed umbo of the shell. The ligament may be considered as external, separating the valves by its contraction when the adductor is relaxed. This ligament takes its rise at the extreme

* Etym. ὄστρεον, a fish, (ὀστέον)?

point or umbo of the shell, and advances with the increase of the animal, apparently in an opposite direction to that of the *Dimyaria*, the additions being made in a somewhat sloping direction inclining towards the anterior side, the successive advance is denoted by the lines of increase, as the fresh layers of calcareous matter are deposited by the animal, most distinctly visible in this ligamental area, which may be called tripartite.

The general substance of the shells of this genus is thick, though they are exceedingly variable in that character, some specimens of the common Oyster possess a solidity of nearly an inch, while others, quite as large, have not a fourth of that thickness.

This is a Marine genus, though many are inhabitants of estuaries, and some will live where the water, at low tide, is not very salt. Its presence, in any formation, is considered to be indicative of its marine nature; none have yet been found as true inhabitants of freshwater. It is a genus of great antiquity, species having been figured from various secondary formations from the lias to the chalk, while some were natives of the Seas during the Eocene Period, all of which have become extinct.

1. OSTREA EDULIS, *Linnæus*. Tab. II, fig. 1, *a*—*c*.

OSTREA. *Lister*. Hist. Conch., lib. iii, fig. 30, A, and fig. 31, 1687.
— *Knorr*. Delices des Yeux, pl. 24**, fig. 2, and pl. 25**, fig. 2, 1766.
— EDULIS. *Linn*. Syst. Nat., ed. 12, p. 1148, No. 211, 1767.
— — *Poli*. Test. Sicil., vol. ii, p. 169, t. 29, fig. 1, 1795.
— — *Mont*. Test. Brit., p. 151, 1803.
— — *Broc*. Conch. Foss. Subap., p. 562, 1814.
— — *G. B. Sowerby*. Genera, No. 6, fig. 1.
— — *De Blainv*. Man. Malac., pl. 60, fig. 1, 1825.
— — *Crouch*. Int. Lam. Conch., pl. 12, fig. 8, 1827.
— — *Goldf*. Pet. Germ., vol. ii, p. 19, t. 78, fig. 4, *a*—*h*.
— — *S. Wood*. Catalogue, 1840.
— — *G. Sow., Jr*. Conch. Man., fig. 180, 1842.
— — *Phil*. En. Moll. Sic., vol. i, p. 90; vol. ii, p. 64.
— — *Nyst*. Conch. Foss. de Belge, p. 327, pl. 31, fig. 2, *a*, *b*, and pl. 33, fig. 2, *a'*, *b'*, 1844.
— — *Loven*. Ind. Moll. Scand., p. 30, 1846.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. ii, p. 307, pl. 54, and pl. T, fig. 1, 1850.
— PSEUDO-EDULIS? *Desh*. Exp. Sc. de. Morée, p. 231, pl. 5, figs. 3, 4.
— DEFORMIS. *Parkinson*. Org. Rem., vol. iii, pl. 14, fig. 3, 1811.
— — *Desh*. 2d ed. Lam., tom. vii, p. 229, 1835.
— HIPPOPUS. *Desh*. 2d ed. Lam., tom. vii, p. 219, 1835.
— BOBLAYEI? *Desh*. Exped. Scient. de Morea, pl. 3, figs. 6, 7, 1833.
— PARASITICA. *Turt*. Brit. Biv., p. 204, pl. 17, figs. 6, 7, 1822.
— — *Flem*. Brit. An., p. 392, 1828.
— — *Thorpe*. Brit. Mar. Conch., p. 120, fig. 108, 1844.
— DENTICULATA? *Born*. Mus. Cœs. Vindobon., p. 113, t. 6, figs. 9, 10, 1780.

OSTREA DENTICULATA. *Desh.* 2d ed. Lam., tom. vii, p. 225.
— — *Broc.* Conch. Foss. Subap., p. 568, 1814.
— FOLIOSA. *Broc.* Conch. Foss. Subap., p. 563, 1814.
— UNGULATA. *Nyst.* Coq. Foss. de Belg., p. 325, pl. 24, fig. 8; pl. 26, fig. 8; and pl. 34, fig. 1, *a*, *a*, *b*, 1844.
— BOREALIS? *Desh.* 2d ed. Lam., tom. vii, p. 220.
— — *Gould.* Inv. Massach., p. 137, 1841.
— SPECTRUM. (*Leathes, M. S.*) Woodward Synop. Tab. Brit. Org. Rem., p. 20, 1830.
— — *S. Wood.* Catalogue, 1840.
— LAMELLOSA. *Goldf.* Pet. Germ., vol. ii, p 18, t. 78, fig. 3, *a*, *b*.
OSTREUM VULGARE. *Dacosta.* Brit. Conch., p. 154, pl. 11, fig. 6, 1778.
AURICULARIA MAXIMA. *Dale.* Hist. and Antiq. of Harwich, p. 291, t. xii, fig. 2, 1730. Ency. Method., pl. 183, figs. 3, 4? pl. 184, figs. 7, 8.

Spec. Char. Testâ variabile, plerumque ovato-rotundatâ, basi subattenuatâ, concentricè lamellosâ, interdum radiato-costatâ, costis imbricatis, undulatis; valvâ superiori planâ.

Shell variable, for the most part of a roundedly ovate form; base of the shell, slightly attenuated, concentrically lamellated, sometimes costated with imbricated and undulated ribs; upper valve flat.

Diameter, 3 inches.

Locality. Cor. Crag, Ramsholt, Sudbourn, Gedgrave.
Red Crag, Passim.
Recent, Britain. North America? Mediterranean?

The earliest appearance of the true edible Oyster seems to have been in the Coralline Crag Period, so far as it is possible to determine a species in this truly variable genus, and its diversified forms were then as great as we see them in the recent shell of the present seas. In the same deposit, at Ramsholt, and in the same bed in close proximity, are two very distinct varieties, from which, as well as from a great dissimilarity of form, solidity of shell, and other differences, it was presumed at the time my Catalogue was drawn up, that they were specifically distinct; but the variety then considered different, and which passed under the provisional name of *spectrum*, corresponds with the recent shell that is now determined by British Conchologists to be only a local variation, and they are, therefore, here united into one species. At Ramsholt there is a complete bed of this shell (*parasitica*), sometimes attached to each other in clusters, or often to the large species of *Balanus*, so abundant in that locality; at this place, also, the thick and ponderous variety (fig. 1, *a*), is occasionally met with, but not in any great profusion; the latter shell is at this place more isolated in its habits and regular in form, and is sometimes marked with nearly obsolete radiating costæ, with a very rugose exterior to the lower or adherent valve, while in the upper valve there are no markings, except the regular lines of growth; in the other variety, there is less appearance of the radiating ribs with a more lamellated exterior, and the shell is much thinner, and less regular in shape, partaking

of irregularities produced by its often confined position, the edges of the lower valve of this variety have sometimes a fimbriated character, like what has been called *denticulata*, parts of the larger valve projecting considerably beyond the upper, more especially on each side of the hinge, where the shelly matter is pushed up or elevated, so as to have, in some specimens, the fanciful resemblance to a spectral appearance produced by a person with extended arms beneath a cloth, which suggested the name to the late Rev. G. R. Leathes. The more common variety of the present day, and the one by which our markets are supplied, does not appear in this deposit, at least, there is no specimen in my cabinet strictly resembling that shell, although there is no doubt the specimens figured are mere modifications of the same species.

A detailed description of this common and well-known shell is unnecessary, as the form and appearance of almost every specimen will present some diversity. It may, however, be observed, that in the interior of the upper valve of some specimens of the thick variety, a little within the hinge, is a small indentation or puncture not present in all, and may be often seen in the common variety of the recent shell: for what purpose this is intended or how produced Malacologists have not informed us, as it appears to have been overlooked, probably, as of no importance; it certainly is of no use as a specific determination, as the same may be seen in specimens of a very different species from the deposits of the older Tertiaries. The form of the impression produced by the adhesion of the adductor muscle, it is to be feared, is a character of no great dependence, assuming, as it often does, a variation in shape conforming, in some slight degree, to the outward form or contour of the shell: in the thick variety, this is generally more or less ovate, its longer axis being from the anterior to the posterior side, and slightly contracted in the middle of the upper part, ascending and somewhat pointed towards the posterior; rounded on the lower side, and rather broader on the anterior, or towards the middle of the shell; in the var. *spectrum* or *parasitica*, this mark is as broad as it is long, and of nearly an orbicular or roundedly quadrate form.

A long and interesting history of this species, and of its commercial value, is given by the authors of the 'Hist. of Brit. Moll.,' who consider the English coast as its peculiar province, and although it has a very considerable geographical range, it is nowhere obtained in such great perfection as in our own seas; there is not in that work any notice of this shell, as an inhabitant of the Mediterranean Sea, and it is certainly not given as a living species by Philippi in his 'En. Moll. Sic.,' nor by Payraudeau in his 'Catalogue of Corsican Shells;' but in Poli's splendid work 'Test. utrius. Sicil. 1795,' is figured and described a group of shells, as well as the animal, of what appears to belong to this species, and from the general accuracy of that observant author, there is very little doubt the specimens were procured in those seas. From the List of Synonymes, it will be seen, that several authors have given this as a fossil from the newer Tertiary formations of that part of the world, where it has been considered by many to be no longer in existence; and the fossil from the Morea,

described by Deshayes as a new species, under the name of *O. Boblayei*, does not appear from the representation to be more than a modified form of our very variable shell; and for my own part, I am much inclined to believe, that Poli was correct, and that it is still an inhabitant of the Mediterranean, as a specimen evidently of this species was lately shown to me by Professor E. Forbes, said to have been obtained by Mr. M'Andrew, very near to Gibraltar. The common Oyster of North America, called *O. borealis*, by Lamarck, which differs very materially in its varieties, is still considered by some Conchologists as doubtfully distinct. Dr. Gould says, 'Invert. Massach.,' p. 138, "The Oystermen maintain that our shell is identical with the English *Ost. edulis*, and there are certainly forms in which the American and European specimens could not be distinguished;" and although this is described by that gentleman under the name of *borealis*, it was evidently his impression also, that it was not specifically distinct, as *Ost. edulis*, Linn. is enumerated in his synonyma. A fossil species, also, from the upper Tertiaries of America, figured and described by Conrad under another name, so strongly resembles our species, as to excite suspicion that it is not really different. It is, however, exceedingly difficult in this, perhaps, more so than in most others, to determine its specific limitation, and every species in this genus seems to possess the character of deviating in a great degree from what might be called its typical form. Sir Charles Lyell, in his 'Second Tour to the United States,' vol. i, p. 312, speaks of the Virginian oyster (*Ost. Virginica*), as resembling the British shell, when it lives isolated and grows freely under water, but that it loses this more rounded form, and becomes greatly lengthened, when living gregariously on banks between high and low water-mark. Our own oyster will assume a variety of forms, dependent principally upon its peculiar position, but no amount of confinement or lateral pressure will train it into the elongated shape of the Virginian shell.

I believe, however, the range of this species in the living state may be said to extend from the Mediterranean to the North-Eastern Coast of the United States, although it appears to have selected, for its more favoured abode at the present day, the seas of our own Island.

The portions of the formation belonging to the Mammaliferous Crag Period have not, to my researches, yielded this species, nor is it enumerated as amongst the Estuary shells of the Norfolk Beds, by Woodward.

2. OSTREA PRINCEPS, *S. Wood.* Tab. I, fig. 1, *a—b*, and Tab. II, fig. 2, *a—b*.

OSTREA UNDULATA. *Nyst.* Coq. Foss. de Belg., p. 324, pl. 24, fig. 7 *a*, and pl. 26, fig. 7 *b*, 1844, (not J. Sowerby).

Spec. Char. Testâ magnâ, crassâ, rotundatâ; valvâ sinistrâ convexâ, costatâ, costis numerosis elevatis, radiantibus, divaricatis, concentricé undato-plicatis; valvâ superiori planâ, obsoletè costatâ.

Shell large, thick, and rounded; left or lower valve convex, ornamented with numerous, elevated, radiating and bifurcating costæ, lines of growth or concentric laminæ of an undulate or waving form, slightly reflected over the ribs; upper valve flat, with faint depressed, or nearly obsolete rays.

Diameter, five inches.

Locality, Cor. Crag, Sutton, Ramsholt, and Sudbourn.

Red Crag, Sutton, Newbourn, and Bawdsey.

This elegant shell was obtained by my friend, W. Whincopp, Esq., of Woodbridge, who has kindly permitted me to have it figured; a similar specimen, though not quite in so great perfection, is in the handsome museum recently erected by the liberal inhabitants of the town of Ipswich; two or three more of the same dimensions are in the possession of E. Acton, Esq., of Grundisburgh, and these with another in the Cabinet of J. S. Bowerbank, Esq., constitute the whole that I have seen of that magnitude.

Such specimens appear to be very rare, as it was never my lot to find so large a one during my researches in the Crag of Suffolk, although the same shell, in its younger state (fig. 2 *b*), has been for many years in my cabinet, and from its presenting characters in that condition, by no means distinct, it was considered only as a variety of *edulis*, but the deeply sculptured markings, so well displayed in the specimen figured, seem to justify its being considered as a different species, although it must be confessed, the gradations of alteration between the young of this, and some of the varieties of the common edible species, are so trifling, that the line of separation cannot satisfactorily be pointed out. There are, in this genus particularly, perplexities in specific determination, so that no diagnosis can be given of any one species that is not liable to serious deviation, and the present name is assigned provisionally, from the apparently marked difference in the adult state, and which, if it be not specifically distinct, its elegance, a rather uncommon character in this genus, will entitle it to be ranked as a marked and peculiar variation, worthy of a distinguishing appellation.

A slightly sinuated form is visible on the posterior side, where the costæ also appear more particularly to have a divaricating character. Upon the young shell the radiating ridges or costæ are but few in number, and by no means prominent or distinct, appearing then strongly to resemble the *edulis;* as it enlarges, the differences become more visible, the rays being prominent and regular. The edge or inner margin of the shell is deeply indented with a slightly reflected edge, thus producing the sub-

lamellated costæ of the exterior. One peculiarity, observable in this shell, is the very small portion of surface by which it was attached, its own substance and weight seeming sufficient security against displacement by the movement of the water.

The form of its muscular impression is elongato-ovate across the shell, differing in no respect in that character from the form displayed by the same muscle in specimens undoubtedly belonging to *edulis*. The upper valve is quite flat, very thick, and only faintly marked with radiations, scarcely visible in the younger state, and on each side of the ligamental area, upon the edge of the shell, are some denticulations like those visible upon the same valve of *edulis* in the same place.

Hinnites.* *De France*, 1821.

Hinnita. *Ferussac.* 1821. *Gray*, 1826.
Hinnites. *J. Sow.* 1827.
Hinnus. *J. Sow.* 1835.
Hynnites. *Herrn.* 1846.

Generic Character. Shell inequivalve, subequilateral, more or less ovate, thick, and strong, covered externally with somewhat irregular, squamose, or radiating costæ. Valves eared with a deep and elongated area for the ligament or cartilage, which is wholly internal; a large ovate impression by the adductor muscle, that by the mantle entire.

ANIMAL UNKNOWN.

This genus was first established by M. de France, in the 'Dict. des Sci. Nat.,' tom. xxi, p. 169, upon a fossil species, which appeared to unite the characters of the two genera, Ostrea and Pecten, differing from the former in adhering by its outer surface, only in its older state, and by the opposite valve: while in the young it was probably fixed by a byssus. It has, by some authors, been united with Pecten since one species of that genus (*P. pusio*), is in the young state fixed by a byssus, but when more grown, becomes attached by the outer surface of its right valve in the same manner. This peculiar habit is here considered as alone insufficient for excluding the present genus, as the extreme solidity of two or three fossil species of typical characters, with a peculiar form in the muscle mark, seem to indicate a difference in the animal inhabitant sufficient to remove them from Pecten.

In the juvenile state the form of the shell is very similar to that of Pecten with its projecting auricles, and an opening or sinus beneath the anterior one in the right valve through which, in all probability, there issued a byssus; as it advanced in age its habits became altered, when it fixed itself by the outer surface of its valve. This same habit is adopted by *P. pusio* in the recent state, though not so in the fossil form of what is considered as the same species in the Crag Formations, where they never

* Etym. ἴννος, hinnus, vel ὖνις, vomer, sec. Herrm.

became attached by the exterior of the shell, but always preserve their regularity or partial freedom. The exterior of the shells in this Genus have not the regularly radiating form of striæ or costæ, so characteristic of the Pectens or fans, but they are ornamented with arched or lamellated fringes or squamose appendages, more resembling the exterior of Spondylus, to which they appear to have considerable affinity, and, indeed, may be considered as a connecting link between Ostrea and that Genus, differing from the former in having distinct auricles in the young state, and in adhering by a different valve; and from the latter, in the absence of those dental characters prominently exhibited in Spondylus.

A few species only are at present known, and those all in a fossil state; two or three are peculiar to the Tertiary Formations, and one has been figured by Mr. Sowerby in 'Min. Conch.,' from the Inferior Oolite of this country.

1. HINNITES CORTESYI, *De France*. Tab. III.

HINNITES	CORTESYI.	*De France*. Dict. des Sci. Nat., t. 21, Art. Hinnites, p. 169, Atlas, fig. 1, 1*a*, 1821.
—	—	*De Blainv*. Malac., pl. 61, fig. 1, 1825.
—	—	*Desh*. 2d edit. Lam., tom. vii, p. 150, 1836.
—	—	*Chenu*. Ill. Conch. Hinnites, pl. 1, fig. 4.
—	CORTESIANUS.	*De Blainville*. Dic. des Sci. Nat., t. 32, 311, 1824.
—	DUBUISSONI.	*J. Sowerby*. Min. Conch., t. 601, 1829.
—	—	*Woodward*. Syn. Tab. of Org. Rem., p. 20, 1830.
—	—	*Id*. Geol. of Norf., p. 44, 1833.
HINNUS	DUBUISSONI.	*J. Sow*. Syst. Ind. to Min. Conch., p. 244, 1835.
—	—	*S. Wood*. Catalogue, 1840.
—	—	*J. Morris*. Catal. Brit. Foss., p. 110, 1843.

Spec. Char. Testâ magnâ, ovatâ, depressâ, crassâ, radiatim et undulatim costatâ; transversim squamoso-lamellosâ; auriculis inæqualibus; sulco cardinali, prælongo, et profundo.

Shell large, ovate, depressed, thick, and strong, with radiating and undulating costæ; ribs covered with squamose projecting lamellæ; auricles unequal; and a deep and elongated sulcus for the ligament.

Length, 5 inches. *Height*, 6 inches.

Locality, Cor. Crag, Ramsholt.

Although a shell of great strength and solidity, it is by no means abundant as a British fossil, and I have seen it only from one locality, and that in the Coralline Crag. The specimen now figured was from a less disturbed part of that deposit, where the two valves of many of the Bivalvia are found in their natural position; while the one figured in 'Min. Conch.' was from a single valve. A few other specimens were obtained by W. Colchester, Esq., from the same spot, and these constitute all that I have as yet seen.

A perfect representation of the Genus Pecten is exhibited in the young shell, and it must then have been difficult to have pointed out a character by which it could be

considered as belonging to any other; there is, however, even in that state an irregularity in the arrangement of the rays, which are at rather unequal distances, and have indications of the squamæ that so prominently ornament the adult shell.

When full grown its true characters are displayed, and no mistake can, I think, then arise respecting its generic distinction from that of Pecten. Our shell is nearly of an oval form, having its height or diameter from the umbo to the ventral margin, one sixth more than in a contrary direction. The lower or adherent valve is rather the deeper of the two, while the upper or left valve is nearly flat; the latter is ornamented with numerous undulating rays at somewhat irregular distances, amounting to as many as forty in one specimen, and these are elevated and arched at different periods of growth, giving a roughened file-like appearance to the exterior; on the other valve the rays are fewer, less regular, and the imbricated squamose appendages larger and more prominent, resembling in that character the common Oyster. The hinge-line in the adult shell is nearly straight, having an elongated and deep sulcus for the ligament, enlarging downwards, and slightly visible externally at the umbo; this is placed a little on the posterior side of the centre, giving a slight inequality to the auricles, the anterior one being of course the larger; the muscle mark is of an enormous size, occupying nearly half the length of the shell, while the diameter of it in the other direction is rather less.

In assigning the Crag shell to H. Dubuissoni, Mr. J. Sowerby says he was guided to that determination by the description only, and having seen but one valve, thought the comparison suited better with the shell from the older Tertiaries than with the other species described by M. De France. I regret exceedingly not having been able to obtain, for comparison, a specimen of either of the two species described by M. De France, and the dependence here is also based upon an insecure foundation. I feel, however, more disposed to refer our shell to *H. Cortesyi*, as well from what appears a greater correspondence in their external characters having both valves for our guidance, as also from the age of the formations in which they were obtained; and as no new name is imposed, the simple alteration is a matter of no great importance should it hereafter be found to be erroneous.

Pecten.* *Pliny, Aldrov,* &c.

Pecten. *Chem.* 1784. *Bolten,* 1798.
Pandora. *Megerle,* 1811.
Janira. *Schum.* 1817.
Neithea. *Drouet.* 1824.
Janera. *G. B. Sow. Jr.* 1842.—*P. maximus.*
Pecten. *Rumphius,* 1705. *Browne,* 1756. *Chem.* 1784.
Ostrea (sp.). *Linn.*
Argus (sp.). *Poli.* 1795.
Chlamys (sp.). *Bolten,* 1798.

* Etym.:—Pecten, a comb.

AMUSIUM (sp.). *Chem.* 1784.
PALLIOLUM. *Id.* -
PYXIS. *Id.* -
PERA. *Id.* - —*P. opercularis.*
PALLIUM. *Martini,* 1773. *Schum.* 1817.
DENTIPECTEN. *Rüppell,* sec. *Gray.*
DECADOPECTEN. *Rüppell,* sec. *Swains.*
PSEUD-AMUSIUM. *Chem.* 1784.—*P. tigerinus.*
AMUSIUM. *Rumph.* 1705. *Chem.* 1784. *Schum.* 1817.
PLEURONECTES. *Schlotth.* 1820.
PLEURONECTIA. *Swains.* 1840.—*P. Gerardii.*

Generic Character. Shell ovate, or suborbicular, subequilateral, inequivalve, with a projecting, generally unequal auricle, on each side of the umbo, surface rayed with striæ, or more or less elevated costæ; beaks approximate and acute. Hinge with a linear groove across the dorsal part of the auricles for the ligament, and a triangular pit or fossette beneath the umbo for the cartilage. Muscular impression of the mantle entire but ill defined; adductor large, excentric.

Animal resembling the shell without the auricular appendages, its mantle disconnected on all sides; the margins bearing generally two rows of tentacular filaments, at the base of which are arranged a series of ocelli or rudimentary eyes; foot small, subcylindrical, containing a groove from which is spun a byssus for its attachment; one large and powerful adductor muscle; no siphonal tubes. Sexes united.

This is a well and strongly-marked genus, generally ornamented with rays, like the expanded sticks of a lady's fan: these in some species are large and highly elevated, while in the more aberrant forms they are nearly obliterated, merging into some which are perfectly smooth, the gradations from the one to the other are so imperceptible as to be without any definable line of demarcation, and although this group has been separated into several Genera, there is no good or permanent character by which they can be distinguished.

In some, the valves are very unequal in size, while in others there is scarcely a perceptible difference, though in most species, by close observation, a trifling inequality may be detected. Those, in which one valve is very convex, while the other is flat, or even concave in its young state, have mostly the larger one buried in the sand, resting in a horizontal position, so that the flat one opens upwards, like the lid of a box, these, when young, are furnished with a byssus, the opening for which is visible in the smaller shell, but becomes obliterated in the adult. The animal probably, in all the species, is capable of producing a byssus for attachment, this, however, is mostly made use of by the young, as when more advanced in growth it appears to be possessed of a considerable degree of locomotive power, which is often employed so as to make considerable progress through the water by means of its large and powerful adductor after opening the valves, and flapping them suddenly together with great rapidity; some species are probably always stationary, as we find at all

ages an opening in one valve through which a byssus of considerable magnitude might have passed; others fix themselves to rocks or foreign bodies by the spinous or imbricated processes of their valves; when fixed like *P. pusio*, it is by the right valve, which is also the one wherein is left an opening for the byssus, and the one also like *P. maxima*, which the animal buries in the sand, it may, therefore, always be considered the lower valve: this is sometimes the most convex, while in those that are free, the greater convexity is generally in the left or upper valve, which, in the living shell, is the more highly coloured.

This is purely a marine genus, and in the recent state has a very extended geographical distribution, being found in almost all parts of the world, while its vertical range is also considerable, inhabiting the seas at various depths; it is also of great antiquity, species having been found as low in the Secondary Series as the Lias, and are continued upwards through nearly every period to the present time; it is largely developed in the newer Tertiaries, and is exceedingly abundant as an existing genus, upwards of a hundred species being already known. It has been quoted as an inhabitant of the Palæozoic Period, but the specimens found in the Coal Measures and Mountain Limestone Rocks, present differences that are considered as generically distinct, and they have been separated by Prof. M'Coy under the name of *Aviculopecten* differing from the true Pectens in the absence of a cartilage-pit, and in the inequalities of the auricles being reversed, thereby connecting it with Avicula.

It is to be feared, that many of our Tertiary specimens have been erected into species without sufficient claim to such distinction, and that several will be found upon further examination to be merely variations of form and sculpture of those which are perhaps more than commonly disposed to deviate from what may be considered as the typical form of long and well-known recent species.

This genus flourished most abundantly in the Crag Seas, and the modifications in the ornamental portions of most of the species render their correct appropriation a task of no ordinary difficulty.

1. PECTEN MAXIMUS, *Linnæus*. Tab. IV, fig. 1, *a—b*, and Tab. VI, fig. 7, *a—b*.

Lister. Hist. Conch., lib. iii, par. 1, fig. 1 A, 1687.
OSTREA MAXIMA. *Linn*. Syst. Nat., p. 1144, No. 185, 1767.
— — *Knorr*. Delices des Yeux, xiv*, fig. 1, 1766.
— — *Donov*. Brit. Shells, pl. 49, 1800.
— — *W. Wood*. Ind. Test., p. 47, pl. 10, fig. 1, 1825.
— — *Broc*. Conch. Foss. Subap., p. 572, No. 16, 1814.
PECTEN MAXIMUS. *Mont*. Test. Brit., p. 143, 1803.
— — *Chem*. Conch. Cab., vii., p. 268, pl. 60, fig. 585, 1782.
— — *Crouch*. Int. Lam. Conch., p. 20, pl. 12, fig. 13, 1827.
— — *Brown*. Illust. Conch. Gr. Brit., pl. 32, fig. 1, 1827.
— — *Desh*. 2d ed. Lam., t. vii, p. 129, 1836.
— — *Payr*. Cat. Moll. Cors., p. 71, No. 132, 1826.
— — *S. Wood*. Catalogue, 1840.

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PECTEN MAXIMUS. *Chenu.* Illust. Conch. Pecten, pl. 2, figs. 1—3, and pl. 29, figs. 1—18.
— — *Loven.* Ind. Moll. Scand., p. 30, 1846.
— — *Alder.* Cat. Moll. North., p. 76, 1848.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 296, pl. 49, 1849.
— — *Sismond.* Syn. Meth. An. Invert. Pedem. Foss., p. 13, 1847.
— — *G. B. Sow. Jr.* Thesaur. Conch., vol. i, p. 45, pl. xv, figs. 98-100, 1847.
— VULGARIS. *Da Costa.* Brit. Conch., p. 140, pl. 9, fig. 3.
— COMPLANATUS. *J. Sow.* Min. Conch., t. 586, 1828.
— — *S. Wood.* Catalogue, 1840.
— — *J. Morris.* Cat. Brit. Foss., p. 114, 1843.
— — *Nyst.* Coq. Foss. de Belg., p. 285, pl. 22 bis, fig. 1, *b*, *b'*, 1843.
— SIMILIS. *G. B. Sow. Jr.* Thes. Conch., p. 46, pl. 16, figs. 116, 117, 1847.
— MEDIUS. *Chem.* Conch. Cab., t. vii, p. 272, t. 60, figs. 586, 587, 589.
— — *Desh.* 2d ed. Lam., t. vii, p. 130, 1835.
— — *Phil.* En. Moll. Sic., vol. ii, p. 59, 1844.
— — *Chenu.* Illust. Conch., pl. 4, figs. 2—6.
— — *Sismonda.* Syn. Meth. Ped. Foss., p. 13, 1847.
— GRANDIS. *J. Sowerby.* Min. Conch., t. 585, 1828.
— — *S. Woodward.* Syn. Tab. Brit. Org. Rem., p. 19, 1830.
— — *S. Wood.* Catalogue, 1840.
— — *J. Morris.* Catal. Brit. Foss., p. 114, 1843.
— — *Nyst.* Coq. Foss. de Belg., p. 284, pl. 21, fig. 6, *b*, *b*, and pl. 22, fig. 1, *a*, *b*, 1844.
Ency. Meth., pl. 209, fig. 1, *a*, *b*.

Spec. Char. Testâ inæquivalvi, suborbiculari; valvâ dextrâ vel inferiori convexâ, superiori planulatâ; radiis magnis, 13—14 *rotundatis, longitudinaliter striatâ; marginibus lati-crenulatis; auriculis æqualibus.*

Shell inequivalved, suborbicular; right or inferior valve convex; left or upper valve flat, or very slightly inflated; ornamented with 13 or 14 large, rounded, and striated ribs or rays; margin broadly indented; ears equal.

Length, $5\frac{1}{4}$; *height,* $4\frac{3}{4}$ inches.

Locality, Cor. Crag, Sutton, Aldbro', Ramsholt, Gedgrave.
Red Crag, Sutton, Bawdsey.
Northern Drift, Ireland (Forbes).
Recent, Britain and Northern Seas, Mediterranean? Red Sea?

This is very abundant in some localities of the Coralline Crag, and particularly variable in its exterior ornament. The peculiar arrangement of the striated portion of the rays, which some of the specimens have assumed, induced authors who have described the Crag shell, to consider it as wholly distinct from the recent British species, and I was long of the same opinion; but the examination of numerous specimens in the cabinets of my Crag collecting friends, has shown a union between the extremes of sculpture, as represented in the variety *grandis*, and that which is commonly exhibited in the generality of recent specimens, by small and almost imperceptible variations, so as to prevent a distinct line of demarcation to be drawn between

them, and as such, they are here considered only in the light of varieties of the living British shell.

M. Nyst, seems to consider the variety *grandis* as a modified form of *P. Jacobæus*, from which opinion I must dissent, believing it to be, as above stated, specifically united with our own species *P. maximus*. In *P. Jacobæus*, the costæ or rays are broader in proportion to the intermediate depression, and are more quadrate: those upon the Crag shell are often as much elevated, but always more or less rounded, without the abrupt or sharp edges, which distinguish the Mediterranean shell. The most prominent character in the var. *grandis*, is the distinct ray in the centre of the depression, while a corresponding kind of sulcus or furrow runs down the centre of the large ray, dividing it into two parts; this character, which in some specimens appears so strongly marked, that it alone would be quite sufficient for specific distinction, becomes in var. *complanatus* scarcely discernible with the rays very much depressed, and in those specimens with this division in the rays, each side appears to be again divided by a less distinct line, or arranged in pairs. *P. medius. Chemn.* is said, by its author, to be intermediate between *Jacobæus* and *Maximus*, partaking, in some degree, the characters of both, but from the figure and description appears to be only a variety of the latter.

A species from Australia, somewhat resembles our Crag fossil, in having the intermediate small ray, but it has no bipartite division of the large rays, while they are rounded and simple on the flatter or upper valve, and may, therefore, only be looked upon as the representative of our species. In the young state, our shell is nearly smooth, while the upper or left valve is concave on the upper surface, in which stage of its existence it was probably furnished with a byssus, as an opening is then visible beneath the auricle of the convex or right valve, but entirely obliterated in the adult shell.

In the Coralline Crag at Ramsholt, many beautiful specimens have been found with the valves united, in what was, probably, a deeper portion of the sea at that period, in association with *Pyrula, Pholadomya, Lingula;* forms, now found only in Tropical or Sub-Tropical Seas, while at the same locality are numerous individuals of species, whose homologues are living at the present day upon the Scandinavian Coast.

The range of this species (*maximus*), in the living state, is given by the authors of the 'Hist of Brit. Moll.,' from the Coast of Norway to Gibraltar. Payraudeau quotes it as found, though rarely, on the West Coast of Corsica; and Born speaks of it also as from the Mediterranean.

2. Pecten Gerardii, *Nyst.* Tab. V, fig. 5, *a—b.*

Pecten Gerardii. *Nyst.* Rech. Coq. Foss. Prov. d'Anv., p. 19, No. 75, pl. 3, fig. 75, 1835.
— — *Potiez. et Mich.* Cat. des Moll. de Douai, t. 11, p. 78, No. 32, 1844.
— — *Nyst.* Coq. Foss. de Belg., p. 300, pl. 18, fig. 11, 1844.
— subdiaphanus. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ orbiculari, subhyalinâ, inæquivalvi, equilaterali, radiatim striatâ, et divaricatim insculptâ; auriculis inæqualibus; margine tenuissimè crenulatâ.

Shell orbicular, subpellucid, inequivalved or somewhat plano-convex, equilateral, externally covered with fine longitudinal rays, visible only near the margin, and beautifully sculptured with diverging or divaricating striæ, auricles unequal.

Diameter, 2 inches.

Locality. Cor. Crag, Ramsholt, Sudbourn, and Gedgrave.

This beautiful species is exceedingly abundant at the latter locality, where, however, the valves are always separated. At Ramsholt, they are somewhat less abundant, and the valves are there found in their natural position.

From the figure and description given by M. Nyst, above referred to, there is little doubt, that the English Crag shell is the same as the one found in the Campinian beds of Belgium. Our shell is very thin, but strong, with irregularly-marked lines of increase; the right valve always more or less flattened, while the opposite one is tumid or convex. Auricles very unequal and rayed, or costated, with a moderate sized opening beneath the anterior one of the right valve, this is almost obliterated in the adult shell, a rather large triangular cartilaginous area overhanging or projecting into the interior. The impression formed by the edge of the mantle parallel with the margin, and extending to about two thirds the length of the shell, that by the adductor, less distinctly defined. The contour of the shell is nearly circular, a little interrupted with a pair of rather high shoulders. A dark line diverges from the umbo, within which the shell is of a lighter colour, like that in *P. corneus*, being, however, perfectly distinct from that species. The beautifully curved or divaricating striæ (from the absence of longitudinal or radiating ribs), are visible upon the smooth surface of the shell with the naked eye. An American fossil, *Pecten Virginianus*, Conrad. 'Foss. of the Med. Tert. of the United States,' p. 46, pl. 21, fig. 10, 1838, appears to resemble our shell in many characters, but from the representation it differs in being longer than high, and has the ears more equal and larger.

3. PECTEN SIMILIS, *Laskey*. Tab. V, fig. 4, *a*—*c*.

PECTEN	SIMILIS.	*Laskey*. Mem. Wern. Soc., vol. i, p. 387, pl. 8, fig. 8, 1811.
—	—	*Brown*. Illust. Conch. Gr. Brit., pl. 32, figs. 5, 6, 1827.
—	—	*Flem*. Brit. An., p. 384, 1828.
—	—	*Forb*. Rep. on Egean Invert., p. 183, 1848.
—	—	*Alder*. Cat. Moll. North. and Durh., p. 77, 1848.
—	—	*Forb*. and *Hanl*. Hist. Brit. Moll., vol. ii, p. 293, pl. 52, fig. 6, and pl. S, fig. 1, 1849.
OSTREA	TUMIDA.	*Turt*. Conch. Dict., p. 132, 1816.
PECTEN	TUMIDUS.	*Turt*. Brit. Biv., p. 212, pl. 17, fig. 3, 1822.
—	—	*Flem*. Brit. Anim., p. 384, 1828.
—	—	*Thorpe*. Brit. Mar. Conch., p. 117, 1844.
—	—	*S. Wood*. Catalogue, 1840.
—	—	*Lovén*. Ind. Moll. Scand., p. 36, 1846.
—	—	*G. B. Sow., Jr*. Thes. Conch., vol. i, p. 57, pl. 13, figs. 27—29, 1847.
—	PYGMÆUS?	*Phil*. En. Moll Sic., vol. ii, p. 61, 1844, (not *Goldf*.)

Spec. Char. Testâ minutâ, suborbiculatâ, æquivalvi, subæquilaterali, tenui, subhyalinâ, planulatâ, glabrâ; auriculis subæqualibus, in valvâ dextrâ anticè longiori, rotundatâ, posticè rectangulatâ; sinu brevi, acuto.

Shell small, suborbicular, equivalved, subequilateral, thin, subpellucid, flattened, smooth; auricles nearly equal; the anterior one of the right valve rather the longer and rounded, on the posterior side it forms a right-angled triangle, with a short and acute sinus.

Diameter, $\frac{1}{4}$ inch.

Locality. Cor. Crag, Sutton. Recent Britain, Finmark, Ægean Sea.

This pretty little shell is particularly abundant at Sutton, in the Coralline Crag, to which formation, as far as is at present known, it is restricted: its minuteness and fragility may, however, be one cause why it has not yet been found in the Red Crag, as it appears to be a species possessed of capabilities to endure a considerable range in temperature, being quoted by Dr. Lovén as having been obtained on the coast of Finmark, while Professor Forbes procured it in considerable numbers from a great depth in the Ægean Sea, some specimens of which he has obligingly given me, for the purpose of comparison with the British fossil.

There are some slight differences between the recent shell and the fossil, but which can hardly be considered of sufficient importance to justify it being ranked as more than a variety; the living species in several characters is subject to variation. The specimens from the Ægean, which were obtained at the depth of 100 fathoms, are rather larger than any I have from the Crag, measuring a little more than a quarter of an inch in its longitudinal diameter, and a trifle less in the height, with the auricles unequal, the anterior one, more especially in the right valve, less than the posterior, but this is not a permanent character, as in some specimens they are equal in size. The Crag shell does not exceed in diameter a quarter of an inch, very rarely attains this magnitude, and the dorsal margin, or rather the ears of the shell, extend to 5-6ths of its entire length. In the right valve the anterior auricle is as large as the posterior one, and completely rounded with a small sharp sinus beneath it, as if the shell, in the living state, had been supplied with a byssus. There is a slight peculiarity in this species in the right valve, attributable probably to the presence and size of the byssus; the diverging line from the umbo is on the posterior side rather convex, while on the opposite, or beneath the projecting ear, it is distinctly concave; in the left valve the auricles are equal in size, and the divergence of the edge of the shell more regular, forming an angle of 90°; this valve is, in the recent state, ornamented with coloured markings of a zigzag, or what is called Vandyke shape, traces of these colours are still remaining in some of the Crag specimens, one of which has only a single line of divergence from near the centre, somewhat like the ornaments upon *Lucina divaricata*. There is also a slight inequality in the depth or convexity of the valves, the right or lower one being a little more tumid than the other.

P. Groenlandicus, Lovén and G. B. Sow., Thes. Conch., p. 57, Pl. 13, fig. 40, appears to differ from our shell only in being somewhat larger.

4. PECTEN TIGRINUS, *Müller*. Tab. V, fig. 2, *a—g*.

PECTEN	TIGRINUS.	*Müll.* Zool. Dan., ii, p. 26, pl. 60, figs. 6—8, 1776.
—	—	*Desh.* 2d ed. Lam., t. viii. p. 155, 1835.
—	—	*Nyst.* Coq. Foss. de Belge, p. 303, pl. 23, figs. 4—10, 1844.
—	—	*Lovén.* Ind. Moll. Scand., p. 31, 1846.
—	—	*Alder.* Cat. of Moll. North. and Durh., p. 77, 1847.
—	—	*Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 285, pl. 50, figs. 8—11.
—	OBSOLETUS.	*Penn.* Brit. Zool., vol. iv, p. 322, t. 64, fig. 3.
—	—	*Don.* Brit. Shells, vol. i, t. i, fig. 2, 1799.
—	—	*Mont.* Test. Brit., p. 149, and sup., p. 57, 1808.
—	—	*Turt.* Brit. Biv., p. 213, pl. 9, fig. 6, 1822.
—	—	*Brown.* Illust. Conch. Gr. Brit., pl. 33, fig. 6, 1827.
—	—	*J. Sowerby.* Min. Conch. t. 541, figs. 1—8, 1828.
—	—	*Nyst.* Rech. Coq. Foss. d'Anv., p. 19, No. 74, 1835.
—	—	*S. Wood.* Catalogue, 1840.
—	—	*J. Morris.* Cat. of Brit. Foss., p. 115, 1843.
—	—	*Thorpe.* Brit. Mar. Conch., p. 118, 1844.
—	PARVUS.	*Da Costa.* Brit. Conch., p. 155, 1778.
—	LÆVIS.	*Penn.* Brit. Zool., vol. iv, p. 102.
—	—	*Mont.* Test. Brit., pp. 150, 579, pl. 4, fig. 1, 1803.
—	—	*Turt.* Brit. Biv., p. 212, 1822.
—	—	*Brown.* Illust. Conch. Gr. Brit., pl. 33, fig. 7, 1827.
—	DOMESTICUS.	*Chem.* Conch. Cab., t. xi, p. 261, pl. 207, figs. 2030—2036, 1783.
OSTREA	OBSOLETA.	*Turt.* edit. Linn., vol. iv, p. 266, 1806.
—	—	*W. Wood.* Ind. Test., p. 50, pl. 10, fig. 37.
—	—	*Mawe.* Linn. Conch., pl. 14, fig. 6.
—	TIGERINA.	*Turt.* edit. Linn., vol. iv, p. 268, 1806.
—	LÆVIS.	*Mat.* and *Rack.* Linn. Trans., vol. viii, p. 100, pl. 3, fig. 5, 1807.
—	—	*W. Wood.* Ind. Test., pl. 10, fig. 38.

Spec. Char. Testâ æquivalvi, æquilaterali, suborbiculari; radiatâ, radiis variis, interdum obsoletis, striis subtilissimis arcuatim divergentibus ornatâ; auriculis valdè inæqualibus.

Shell equivalve, equilateral, suborbicular; costated costæ variable, sometimes obsolete, or small and numerous, sometimes arranged in fives; ornamented with fine curved and diverging striæ, ears very unequal.

Diameter, 1 inch.

Locality. Cor. Crag, Sutton, Ramsholt, Gedgrave, Sudbourn.
Red Crag, Sutton, Bawdsey, and Walton Naze.
Recent, Britain and North Seas.

This is a very abundant species in the Coralline Crag, with as great a range in

variation as is exhibited by those obtained in our own seas at the present day. In the Red Crag, specimens are much more scarce, although var. δ I have seen only from this Formation.

From the great diversity of forms displayed by this animal, it is not to be wondered at, that it should have been separated into several species: with variations exceeding in appearance what are generally considered as sufficient for specific distinction, there is no permanent character that will justify their separation. In the Crag as well as in the recent state, specimens may be obtained presenting every minute gradation, and these apparently different forms are now justly included under one name.

In var. *a* the shell is nearly smooth (*lævis, Penn.*), or at least without any distinct longitudinal ribs or striæ, or with the edges only presenting these radiations; this may be considered as one extreme of the species, while the other variety exhibits five large elevated ridges or ribs; these are generally separated, and in pairs, though they are sometimes simple, the intermediate spaces are filled up with three or more rays. Var. β may be called lenticular, with numerous fine rays covering the entire surface, sometimes single, sometimes in pairs; var. γ has four or five raised ribs, as before described; var. δ has from seven to nine rays, which are themselves faintly striated, while the intermediate spaces are also filled with radiating lines; but these forms are not permanent, and specimens uniting some of the characters of each may be commonly obtained. Every specimen is strongly marked with fine divaricating striæ, in a curving direction from the umbo to the sides. In the young state the shell is often very scabrous, the rays being covered with regularly raised imbrications. The general form may be described as suborbicular, though the greater diameter is from the umbo to the ventral margin. The auricles may be considered its most distinguishing character; these are very unequal, the posterior one small, nearly obsolete, while that on the anterior side is large, generally costated, or coarsely rayed. In the early stages of its growth, the shell is always regularly convex or lenticular, but in some specimens, when at a certain size, its form is altered by the enlargement of the shell on the inner edge of the margin instead of outwardly, so as to give a greater space to the interior without much increasing the diameter of the shell, and this character is exhibited in both valves. Fig. 2, *g*, is what in my Catalogue was enumerated with doubt as a new species, under the name *exoletus*, but which probably is only a giant monstrosity of this species, as the ordinary form is well displayed on the outside, beyond which, by apparently an extra effort of growth, it has induced a deposit of calcareous matter, till it has reached a diameter of 1½ inches, thus much exceeding the general size of this species, which is rarely more than one inch. Fig. 2, *a*, is from a specimen belonging to Mr Bridgman, obtained in the Mammaliferous Crag, near Norwich.

The animal in the recent state is said to range from 12 to 60 fathoms, while 18 or 20 is its most favorite depth.

5. PECTEN BRUEI, *Payraudeau.* Tab. V, fig. 3, *a—b.*

PECTEN BRUEI. *Payr.* Cat. Moll. de l'Ile de Corse, p. 78, pl. 2, figs. 10—14, 1826.
— *Desh.* Append. Lyell's Princ., vol. iii, p. 14, 1833.
— — *G. B. Sow., Jr.* Thesaur. Conch., vol. i, p. 70, pl. 20, figs. 241-2, 1847.
— — *Chenu.* Illust. Conch. Pecten, pl. 39, fig. 6, *a—c.*
— PICTUS. *Goldf.* Pet. Germ., vol. ii, t. 97, fig. 4, *a—c*, 1830 (not *Da Costa*).
— STRIATUS? *Goldf.* Pet. Germ., vol. ii, t. 96, fig. 3, *a—b.*
— LAMALII. *Nyst.* Coq. Foss. de Belg., p. 305, pl. 22, fig. 5, *a—b*, and pl. 24, fig. 5, 1844.
— PANDORÆ? *Desh.* Exped. Scient. de Morea, pl. 2, figs. 12—14, 1833.

Spec. Char. Testâ suborbiculari, æquivalvi? æquilaterali, convexiusculâ; radiatim costatâ, costis 18—20 *convexis inæqualibus, longitudinaliter tenuissimé lineatis, in juventâ nodosis vel subimbricatis; auriculis alteris minimis, radiantibus.*

Shell suborbicular, equivalve? equilateral, slightly convex; costated with 18 to 20 unequal rounded ribs, finely striated longitudinally; and nodose or imbricated in the young state; auricles unequal and rayed.

Diameter, ½ an inch.

Locality, Coralline Crag, Sutton. Recent, Mediterranean.

Five or six separated valves are all that I have obtained, and these appear to correspond with the recent species above referred to. Four localities are given by Payraudeau, of recent habitats, who says it is "peu abondant." The shell figured by Nyst is presumed to be the same, from the disposition of the rays; but he speaks of irregular and oblique striæ upon the sides of the shell, like those upon *tigrinus;* these I have not been able to detect in my specimens, which, however, may but ill display such sculpture, as they are, probably, only young individuals, not measuring more than half the diameter of the Belgian fossil; but from the representation, there is a slight difference, the auricles of his shell are rather more rounded, and more unequal, and approach nearer in that character to one of the varieties of *tigrinus.*

Our shell may be further described as having rounded rays generally single, sometimes arranged in pairs, but in no regularity in either the right or left valve, while the whole surface, as well on the costæ as between them, is covered with radiating striæ, these appear like linear markings in the shell, and not upon it, the line being alternately of a light and dark colour, that upon the centre of each rib, larger or broader than the rest.

In the young shell, the rays are ornamented with nodose protuberances, and the interstices have then also a raised portion of the shell, so that, in its young state, the surface is prettily cancellated. The auricles are unequal, the anterior one being the larger of the two, though not displaying so great a disparity as in *tigrinus;* they are sharp and rectangular, and not the least rounded, covered with prominent rays, which are strongly decussated by raised lines of growth: there is a small byssal sinus under the anterior auricle.

This is quite distinct from any of the varieties of *P. tigrinus*, the larger or more rounded form of the rays, as well as less inequality in the auricles, will distinguish it; and in all the varieties of that species, strongly marked divaricating striæ, or curved lines radiating from the umbo, may easily be observed, but I have been unable to detect such markings upon my specimens of this species, although individuals of *tigrinus*, much less in size, exhibit them distinctly; and it seems also to be specifically different from *P. Dumasii*, in which the rays are larger, fewer, and more prominent, and the auricles of our shell are comparatively larger than those in that species. In the recent state, this is, probably, a deep water species, as Payraudeau speaks of his specimens having been obtained by means of the dredge.

6. PECTEN DANICUS, *Chemnitz*. Tab. IV, fig. 2.

PECTEN DANICUS. *Chem.* Conch. Cab., t. xi, p. 265, pl. 207, fig. 2043, 1795.
— — *G. Sow.* Thesaur. Conch., vol. i, p. 61, pl. 12, figs. 16 & 187.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 288, pl. 52, figs. 1, 2, 7—10.
— GLABRIS. *Brown.* Ill. Brit. Conch., pl. 32, figs. 3, 4, 1827.
— DUMASII. *Payr.* Cat. Moll. de l'Ile de Corsi., p. 75 pl. 2, figs. 6, 7, 1826.
— — *Desh.* Append. Lyell's Princ., vol. iii, p. 15, 1833.
— — *Forbes.* Rept. Ægean Invert., p. 183, 1843.
— — *Jeffreys.* Ann. Nat. Hist., vol. xix, p. 313.
— ASPERSUS. *Desh.* 2d ed. Lam., t. vii, p. 136, 1836.
— — *Phil. En.* Moll. Sic. vol. i, p. 82. 1836; and vol. ii, p. 57, 1844.
— JAMESONI. *Smith.* Mem. Wern. Soc., vol. viii, p. 58, pl. 2, fig. 1, 1838.
— — *Brown.* Illust. Conch. Gr. Brit., 2d edit, p. 73, pl. 25, fig. 7.
— SEPTEMRADIATUS. *Loven.* Ind. Moll. Scand., p. 31, 1846.
— TRIRADIATUS. *Müll.* Zool. Dan., vol. ii, p. 25, pl. 60, figs. 1, 2, (fide *Loven* and *Desh.*)
OSTREA HYBRIDA. *Gmel.* Syst. Nat., p. 3318, 1788 (fide *Loven*).
— — *W. Wood.* Ind. Test., p. 48, pl. 10, fig. 10, 1825.
— TRIRADIATA. *Turt.* ed. Linn., vol. iv, p. 268, 1806.
— — *W. Wood.* Ind. Test., p. 50, pl. 10, fig. 39, 1825.
— SEPTEMRADIATA. *Id.* - - p. 268, 1806.
— INFLEXA. *Poli.* Test. Sicil., vol. i, p. 160, t. 28, figs. 4, 5.
— CLAVATA. *Id.* - - - p. 161, t. 28, fig. 17.
PECTEN PSEUD-AMUSIUM. *Desh.* Exped. Scient. de Morea, p. 231, pl. 2, figs. 9—11, 1833.
Ency. Meth., pl. 212, fig. 6.

Spec. Char. Testâ subrotundatâ, æquilaterali, radiis 5—6 *rotundatis inæqualibus, striatis; auriculis inæqualibus.*

Shell subcircular, equilateral, thin, with rounded or convex rays varying in number from 5 to 6 striated; auricles unequal.

Diameter, 1 inch.

Locality. Clyde Beds. Recent, Ægean, and Scandinavia.

Although this species, in the recent state, has been obtained in the Ægean, as well as in the Mediterranean Sea, and is quoted also by Philippi as an abundant fossil

in the Sicilian Beds, I have not yet seen it from any of the three Crag Formations of Essex, Suffolk or Norfolk. As it is a fossil in the Clyde Beds, and may, probably, be hereafter found in the Crag, it ought not to be here passed over in silence. The specimen figured (which is the right valve) was given to me by James Smith, Esq., of Jordan Hill, and is undoubtedly identical with the British shell recently obtained in considerable plenty by Mr. George Barlee.

Our specimen contains a good deal of animal matter, with some slight remains of colour, as indicative of its comparatively modern origin. The shell like that of *P. tigerinus*, is ornamented with curved radiating or diverging striæ, but less prominent and distinct, and most visible at the lateral edges. A specimen of *P. Dumasii*, given to me by Professor Edward Forbes, which he obtained from a great depth in the Ægean Sea, does not appear to differ specifically from the British shell, and I have followed his example in uniting the two. Our fossil, however, appears to agree with the recent British specimens better than with the *Dumasii* from the Mediterranean, in having a rather larger posterior auricle; but my specimen from the Ægean differs also in that character from the Mediterranean shells, in having as large an auricle comparatively as the British specimens. The number of ribs is a variable character; sometimes the right valve has six, when the left one has only five, the depressions of the one valve corresponding to the elevations of the other, and *vice versâ*.

In this, as in most of the species of this genus, the auricles are comparatively larger in the younger shell than in the adult; my specimen, is a full grown shell, with six ribs or elevations, and the whole surface rayed or striated longitudinally, made rough or scabrous by elevated lines of growth, and the diverging or curved striæ visible only at the sides.*

7. Pecten Princeps, *J. Sowerby*, Tab. VI, fig. 1.

Pecten Princeps. *J. Sow.* Min. Conch., t. 542, fig. 2, 1826.
— — *Woodward.* Geol. of Norf., p. 44, 1833.
— — *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. of Brit. Foss., p. 115, 1843.
— Clintonius? *Say.* Journ. Acad. Nat. Sci., vol. iv, p. 135, pl. ix, fig. 2, 1824.
— — ? *Conrad.* Foss. of the Med. Tert. of the United States, p. 47, pl. 23, fig. 1, 1838.
— sublævigatus? juv. *Nyst.* Coq. Foss. de Belge, p. 298, pl. 24, fig. 4, 1844.

Spec. Char. Testâ, orbiculari, subinæquivalvi, convexâ, longitudinaliter costatâ, costis numerosis confertis, subsquamosis, interstitiis divaricatim striatis; auriculis magnis subæqualibus; valvâ dextrâ minori.

Shell orbicular, slightly inequivalve, convex, externally ornamented with numerous close set, rounded and slightly squamose or imbricated striæ, with a small inter-

* A specimen much worn, and without its auricles, very recently found in the Red Crag, is in my Cabinet, and may possibly be of this species, but it is too much mutilated for fair examination.

mediate ray in the aged shell, and fine diverging striæ visible between the rays; ears large, nearly equal, and rayed; right valve the smaller of the two.

Length, $5\frac{3}{8}$. *Height*, $5\frac{1}{4}$ inches.

Locality. Cor. Crag, Ramsholt.

This noble shell appears not to have lived beyond the Period of the Coralline Crag, at least, I have not seen it from any more recent deposit, although Woodward, in his 'Geol. of Norf.' has included it in his List of Fossils from the Mammaliferous Crag at Thorpe, with the letter *a* at the end of the locality, denoting its abundance, but I have not been able to see a specimen, or ascertain that it was even found in that formation, perhaps, fragments or imperfect specimens of *P. Islandicus* may have been mistaken for it.

This is the largest species of the genus belonging to the nearly equivalved section, equalling in magnitude the common Scallop. *Pecten Magellanicus* somewhat resembles this shell, and may be considered its representative on the other side of the Atlantic; but it has not the rays so distinctly marked or elevated as those upon the Crag shell, and is a flatter or more compressed species, with a few other minor distinctions sufficient to separate the two.

An American fossil above referred to, as far as can be determined by the figure and description, appears so closely to resemble our shell, that they are here considered as probably the same species; some slight differences may, however, be pointed out, as our reliance is entirely upon the representation, without the opportunity of comparison. Our shell has the auricles large and unequal, those on the posterior side being much the smaller, while in the American fossil they appear more equal, and somewhat less, and the rays are represented as bifurcating, or double in number, on the outer part of the shell, or its latter growth; the Crag shell has from 70 to 80 small and convex rays, rounded and slightly imbricated, but never angulated, the distance between them about equal to the rays; at the outer part of my largest specimen is an intermediate ray, thereby resembling the figure of the American fossil; between the rays may be seen fine diverging or divaricating striæ, crossing the lines of growth in an oblique direction. Under the anterior auricle of the right valve is a large opening. The valves are closed nearly all round, slightly gaping at the shoulders. The same sized rays ornament the auricles, which are also scabrous. Oysters and Barnacles are attached to the roughened surface of the shell, and may be seen, sometimes upon the right, in others on the left valve.

This was found, *in situ*, in the tranquil deposit at Ramsholt. *Pecten sublævigatus Nyst*, so much resembles a small specimen in my possession, that it is probably only the young state of this species.

Say's name appears to have priority of date, but from the uncertainty of identification, the much more appropriate one given by Mr. Sowerby has, for the present, been retained.

8. PECTEN PUSIO, *Pennant.* Tab. VI, fig. 4, *a—c.*

Lister. Hist. Conch., lib. iii, par. 1, figs. 9, 18? and 23? 1789.
PALLIOLUM? *Chem.* Conch. Cab., vii, p. 333, t. 67, figs. 635-6, 1784.
OSTREA MINIATA. *Born.* Mus. Cæs. Vind., p. 104, t. vii, fig. 1, 1780.
— MULTISTRIATA. *Poli.* Test. Sicil., vol. ii, p. 164, t. 28, fig. 14, 1795.
— PUSIO. *Don.* Brit. Shells, vol. i, pl. 34, 17[illegible].
— SINUOSA. *W. Wood.* Ind. Test., p. 50, pl. 10, fig. 34, 1825.
PECTEN PUSIO. *Penn.* Brit. Zool., vol. iv, pl. 61, fig. 65.
— — *Turt.* Brit. Biv., p. 215, pl. 17, fig. 2, 1822.
— — *Payr.* Cat. Moll. de l'Ile de Cors., p. 74, 1826.
— — *G. B. Sowerby.* Genera, No. 31, fig. 6.
— — *Phil.* En. Moll. Sic., vol. i, p. 84, and vol. ii, p. 58, 1844.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 278, pl. 50, figs. 4, 5; pl. 51, fig. 7.
— DISTORTUS. *Da Costa.* Brit. Conch., p. 148, pl. 10, figs. 3, 6.
— — *Mont.* Test. Brit., p. 148, and Sup., p. 61, 1808.
— — *Lovén.* Ind. Moll. Scand., p. 30, 1846.
— SINUOSUS. *Turt.* Brit. Biv., p. 210, pl. 9, fig. 5, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 32, fig. 2, 1827.
— — *Forbes.* Geol. Surv. of Gr. Brit., vol. i, p. 86, 1846.
— SPINOSUS. *Brown.* Illust. Conch. Gr. Brit., pl. 33., fig. 8, 1827.
— STRIATUS. *J. Sowerby.* Min. Conch., t. 394, figs. 2—4, 1823.
— — *Dujard.* Mem. Soc. Geol. de France, t. ii, pl. 2, p. 270, No. 3, 1837.
— — *Nyst.* Coq. Foss. de Belg., p. 301, pl. 15, fig. 1, *b, b', d,* 1843.
— SERRATUS. *Dubois.* Conch. Foss. de Wolhyn. Podol., p. 73, pl. 8, fig. 5, 1831.
— GLORIA MARIS? *Id.* - - - p. 72, pl. 8, figs. 6 & 19, 1831.
— SQUAMULOSUS. *Desh.* Exped. Sci. de Morea, pl. 5, fig. 7—11, 1833.
— LIMATUS. *Goldf.* Pet. Germ., vol. ii, p. 59, pl. 94, fig. 6, *a—b.*
— — *Chenu.* Conch. Illust. Pecten, pl. 49, fig. 5.
— ELONGATUS? *Goldf. Loc. cit.*, pl. 94, fig. 7, *a—c.*
HINNITES PUSIO. *G. B. Sow., Jr.* Conch. Man., fig. 173.
— SINUOSUS. *Desh.* 2d ed. Lam., t. vii, p. 149, 1836.
— — *G. B. Sow., Jr.* Thesaur. Conch., vol. i, p. 79, pl. 20, figs. 1—3, 1847.
— IRREGULARIS. *Desh.* Ency. Meth. Vers., t. ii, p. 273, No. 1.

Spec. Char. Testâ orbiculato-ovatâ, subæquivalvi, æquilaterali, radiatâ, radiis confertis, numerosis, 2—3 *partitis, irregularibus, lævibus aut scabris; auriculis inæqualibus.*

Shell orbiculato-ovate, subequivalve, equilateral with numerous close-set rays, in sets of two or three, irregularly scabrous, with very unequal auricles.

Longitudinal diameter, 2 inches; *height,* 2$\frac{3}{8}$ths of an inch.

Locality. Cor. Crag, Sutton, Ramsholt, and Sudbourn.
Red Crag, Sutton, Bawdsey, Walton Naze.
Recent, Britain, Mediterranean, Bergen.

This shell is abundant in both formations, and in the Coralline Crag at Ramsholt the two valves are often united. In the young state, the Crag shell so much resembles the recent specimens of the same size, that it cannot be considered otherwise than

identical, as suggested by Philippi, 'En Moll. Sic.,' vol. i, p. 84, notwithstanding a material change in its habits appears to have taken place in the modern shell, where, after it has attained a certain age or magnitude, it attaches itself to some stone or rock, by the entire surface of the right valve adhering by the scabrous or imbricated portions of the rays, in consequence of which it is often distorted, moulding itself to the inequalities of the body to which it is fixed, producing great variation in form, from which circumstance the recent shell has been separated into two or more species. This does not appear to have been the habit of the Crag shell, as amongst the numerous specimens I have seen, there is no indication of its having been attached by the exterior surface, but may have been a fixed species by means of a byssus, as in all the right valves a large opening exists beneath the anterior auricle, so far resembling the habits of the recent species in being fixed though by a different process.* Some of my specimens have attained a diameter of rather more than $2\frac{1}{4}$ inches from the umbo to the ventral margin, but, unlike the full-grown recent shell, have retained their regularity of form throughout their whole existence. There is often a slight obliquity in the shell, produced probably from its attached habits, the large byssus causing the auricle on that side to be more elevated than on the posterior, which is not only much smaller, but more depressed. The valves are nearly equal in convexity, though the right one is a little the flatter of the two, and in general the rays are arranged in pairs, unequal in size, the larger one being scabrous, sometimes less regular with three of different sizes, and all imbricated, the exterior is, however, very deceptive in this character, as in one variety which from the entire absence of these imbrications as well as from a greater regularity in the rays, it was assumed to be a distinct species, and passed in my catalogue under the name of *striaturus*, which there is reason now to believe is not entitled to that distinction. At the anterior opening beneath the auricles, are five or six elevated ridges for the purpose, probably, of keeping the byssus more spread, or in its place, and the shell appears to have had a somewhat large cartilaginous area, as well as a broad surface for the attachment of the ligament, the valves opening about five and twenty degrees. In the young as well as in the adult shell, there is a great inequality in the size of the auricles.

In this, as in many species of this genus, the exterior is ornamented with fine divaricating striæ, crossing the lines of growth at nearly right angles, visible also in the recent shell, and between the rays the surface is often subcancellated by the reflexed or thickened margin of the shell at the varied periods of increase.

The recent shell is stated, by the authors of British Mollusca, to range from near low water mark to 90 fathoms: most plentiful between 15 and 28. Its lateral range extends from the Mediterranean to the Norwegian shores.

* Although never being itself fixed by the shell, its roughened exterior is well adapted for parasitical animals and we, consequently, find Oysters or Barnacles adhering to the valves.

9. PECTEN OPERCULARIS, *Linnæus*. Tab. VI, fig. 2, *a—d*.

List. Hist. Conch., lib. iii, fig. 27.
OSTREA OPERCULARIS. *Linn.* Syst. Nat., p. 1147, No. 202, 1767.
— — *Born.* Mus. Cæs. Vindobon, p. 106, 1780.
— — *Schröt.* Einleit in die Conchyl., iii, p. 317, t. ix, fig. 3, 1784.
— — *W. Wood.* Ind. Test., pl. 10, fig. 43.
— SUBRUFA. *Don.* Brit. Shells, vol. i, pl. 12, 1799.
— LINEATA. *Don.* Brit. Shells, vol. iv, pl. 116, 1803.
— SANGUINEA. *Poli.* Test. Sicil., vol. ii, pl. 28, figs. 7-8.
— — ? *Knorr.* Delices des Yeux., t. iv, fig. 1, 1766.
— PLEBEJA. *Broc.* Conch. Foss. Subap., p. 577, t. 14, fig. 10, 1814.
PECTEN PICTUS. *Da Costa.* Brit. Conch., p. 144, pl. 9, figs. 1, 2, 4, 5, 1778.
— LINEATUS. *Id.* - - p. 147, pl. 10, fig. 8.
— — *Mont.* Test. Brit., pp. 147, 579, 1803.
— — *Chenu.* Conch. Illust. Pecten., pl. 30, figs. 1, 2.
— OPERCULARIS. *Chem.* Conch. Cab., vii, p. 341, pl. 67, fig. 646, 1782.
— — *Mont.* Test. Brit., p. 145, 1803.
— — *Lam.* Hist. des An. Sans. Vert., vi, p. 172, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 33, fig. 1, 1827.
— — *Payr.* Cat. des Moll. de la Corse., p. 77, 1826.
— — *Chenu.* Conch. Illust. Pecten., pl. 48, fig. 3.
— — *Goldf.* Pet. Germ., t. ii, p. 62, tav. 95, fig. 6, 1833.
— — *Phil.* En. Moll. Sic., p. 82, t. 6, fig. 2, 1836.
— — *G. B. Sow., Jr.* Thes. Conch., p. 53, pl. 17, figs. 141—146, 1847.
— — *Lovén.* En. Moll. Scand., p. 30, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii. p. 299, pl. L, fig. 3; L i, figs. 5, 6; L iii, fig. 7, 1849.
— SULCATUS. *J. Sowerby.* Min. Conch., t. 393, fig. 1, 1823.
— — *Woodward.* Geol. of Norf., p. 44, 1833.
— — *Nyst.* Rech. Coq. Foss. Prov. d'Anv., p. 19, 1835.
— RECONDITUS. *J. Sowerby,* Min. Conch., t. 575, figs. 5, 6, 1827.
— — *Nyst.* Rech. Coq. Foss. Prov. d'Anv., p. 19, No. 73, 1835.
— — *Potiez et Mich.* Cat. Moll. de Douai, p. 77, pl. 49, figs. 1, 2.
— SUBRUFUS. *Turt.* Brit. Biv., p. 210, t. 17, fig. 1, 1822.
— AUDOUINII. *Payr.* Cat. Moll. de Cors., p. 77, pl. 2, figs. 8, 9, 1826.
— PLEBEIUS. *J. Sowerby.* Syst. Ind., p. 244, 1835.
— — *Bronn.* Leth. Geog., ii, p. 916, t. 39, fig. 16, 1838.
— SOWERBYI. *Nyst.* Conch. Foss. de Belg., p. 293, pl. 22, fig. 3, *b'*, and pl. 22 *bis.*
— MALVINÆ. *Dubois de Montp.* Conch. Foss. Wolhyn. Podol., p. 71, pl. 8, figs. 2, 3.
— FLAVUS? *Id.* - - - - - p. 72, pl. 8, fig. 7.
— RECTANGULUS? *Id.* - - - - - p. 72, pl. 8, figs. 10, 11.
— PULCHELLINUS? *Id.* - - - - - p. 70, pl. 8, fig. 8.
— RADIANS? *Nyst.* Coq. Foss. de Belg., p. 294, pl. 24, fig. 3, 1844.
— 20-SULCATUS. *Müll.* (fide *Lovén.*)
Description de l'Egypt Hist. Nat., pl. 13, figs. 5, 1—4, and pl. 14, fig. 8, 1826.
Ency. Meth., pl. 212, fig. 2.
Dale. Hist. and Antiq. of Harwich, p. 291, t. xi, fig. 1, 1730.

Spec. Char. Testâ suborbiculari, subæquivalvi, longitudinaliter radiatâ radiis 18—26,

squamosis, squamis crebris, transversis, interradios divercatim striatis; auriculis subæqualibus; valvâ sinistrâ convexiori.

Shell suborbicular, slightly inequivalved, covered with 18—26 imbricated or squamose rays, squamæ numerous and close set, between the rays are visible fine divaricating striæ; auricles nearly equal; the left valve, the more convex one.

Diameter, $2\frac{1}{2}$ inches.

Locality. Cor. Crag, Passim.
Red Crag, Id.
Mam. Crag, Bramerton and Thorpe.
Recent, Britain, Finmark, and Mediterranean.

This is one of the most abundant shells, in the Coralline, as well as in the Red Crag Formations, and is exceedingly variable as regards the ornament and arrangement of its exterior, which has caused it to be separated into many different species, so greatly, indeed, does it vary in this character, that scarcely any description can be given of its sculpture, but what some deviation may be observed, so as almost to induce an opinion, that such difference might be considered as a specific distinction. The most abundant variety is that which corresponds with the rough and imbricated shell, now found living in the Mediterranean, figured and described as a new species by Payraudeau, under the name *P. Audouini*. This shell may be found in almost every locality, in the Coralline as well as in the Red Crag.

Both valves may be described as somewhat convex, though the upper or left valve is decidedly the more tumid of the two. Our shell is ornamented with more or less rounded rays, divided into threes, varying in number from 18 to 26, these are rather wider than the intermediate spaces, and are covered with rough imbricated squamæ, and the spaces between the ribs are generally imbricated in the same way. In the young shell the tripartite form of arrangement is seldom to be seen, the rays then being single, and this continues sometimes till the shell has increased to more than an inch in diameter; and the division of the intermediate space into three rays, does not, in some specimens, show itself until even a greater magnitude, by which the young shell differs so materially in its ornament, as to have been made into new species. In one variety of my Crag specimens, the rays are so strongly imbricated with reflexed squamæ, that in my Catalogue, it was considered a distinct species, and intended to have been described under the name *scabrotus* (fig. 2, *c*); but the possession of more specimens and further examination, give reason to believe it to be only a modification of the above species: in this, which, is somewhat of a young shell, the ribs are single, but the imbrications are continuous undulating over and between the ribs. The var. *lineolata*, I have seen only from the Red Crag, and that but rarely. *P. reconditus*, Min. Conch., is I conceive, to be only that form sometimes met with in which the rays have preserved their unity until the specimen has attained a magnitude of an inch and a half in diameter, although in some specimens, they separate into threes

long before they attain that size, the separation of the rays generally producing a corresponding ornament upon the intermediate spaces, although that often depends upon the width of those spaces. This appears to differ from the London Clay shell and I doubt its being *Ost. recondita*, Brander.

In my specimens from Barton, are two varieties, one not having more than 18 or 20 rays, while the other has 30—32, these are more rounded than in the Crag shell; when perfect, in general they are more or less eroded, they are striated both upon and between the rays, but never distinctly keeled, the imbricated lines of growth are finer, and the auricles are comparatively larger. Nor could I detect upon them the fine divaricating striæ.

The auricles of our shell may be described as unequal, that of the left valve on the anterior side projecting, so as to form an angle less than 90°. In the right or flatter valve, the anterior auricle is longer or projects further than the posterior one, leaving in the full grown shell a considerable opening, even in those which have exceeded two inches and a half, and on the edge of the shell on that side are prominent denticles, four or five of which may be seen in the open space beneath the auricle.

The height of most specimens measuring from the umbo to the ventral margin, is rather less than the diameter of the opposite direction, although in some specimens these dimensions are reversed. The angle formed by the divergence of the rays from the umbo may be called a right angle, although it sometimes exceeds, while in the more elongated specimens, it falls short of that size. In some old shells, the anterior and posterior sides are extended, so as to give a high-shouldered appearance to the valve; and in all the younger specimens, the comparative size of the auricles is greater than in the larger shells, indeed, in the pullus state, they are equal to the entire length, and the shell then is nearly smooth.

Under a lens, fine divaricating striæ may be seen diverging or curving over the shell.

This species is stated by the authors of the 'Hist. Brit. Mollusca,' to possess a great vertical range, from five to one hundred fathoms, while its peculiar province in the British Seas is between fifteen and twenty-five.

10. PECTEN GRACILIS, *J. Sowerby*. Tab. VI, fig. 5.

PECTEN GRACILIS. *J. Sow.* Min. Conch., t. 393, fig. 2, 1825.
— — *S. Wood.* Catalogue, 1840.
— — *J. Morris.* Cat. Brit. Foss., p. 114, 1843.

Spec. Char. Testâ gracili, suborbiculari, compressâ vel planiusculâ, tenui, costatâ; costis acutis, angustis, inæqualibus, tripartitis, concentricè et tenuissimè imbricato-striatis; auriculis parvis inæqualibus.

Shell suborbicular, compressed or flattened, delicate, thin, and fragile, costated, ribs sharp and fine, unequal in size, arranged in threes; finely striated concentrically, with imbricated and slightly elevated lines of growth, ears small and unequal.

Diameter, 1½ inches.

Locality. Red Crag, Sutton, Holywells, and Bawdsey.

This, as yet, I have seen from the Red Crag only, and in that Formation it is by no means abundant.

Some varieties of *P. opercularis* seem to approach this so closely, that it is possible it may be only a modification of that variable species, with more attenuated and depressed valves than are commonly seen; there are, however, some differences which must, at least for the present, keep them separated, more especially as there is no necessity for the imposition of a new name. The variety linearis of that species, in the form and arrangement of its sculpture, appears to approach the nearest to our shell.

In *P. gracilis* both valves are much flattened, the right valve rather the more so of the two; the auricles appear comparatively less than in opercularis, and the rays are arranged much in the same manner, but rather more numerous, varying from twenty to twenty-six, generally tripartite or ranged in threes, the centre one the most elevated and the most sharp, with an intermediate one between the three, so that every fourth ray, as stated by Sowerby, 'Min. Conch.,' vol. iv, p. 129, is the most prominent and the most conspicuous; the same disposition of the rays may be observed in opercularis, var. *linearis*, only in that shell, neither the valves nor the rays are so much depressed. Our shell is ornamented with fine concentric striæ, or raised and subimbricated lines of growth, giving a roughness to the feeling, more than to the eye, but the same sculpture is present in *linearis*.

The most material differences are a greater flatness in the valves, a much thinner shell, with a slight alteration in proportionate or comparative dimensions, and smaller auricles; this last may, perhaps, be looked upon as the most distinguishing character, if they be really distinct, which more numerous specimens than I possess may perhaps determine.

A shell from the older Tertiaries at Bracklesham, somewhat resembles this in its graceful and elegant form, and slightly so in the disposition of the sculpture, but it has more numerous rays, and the imbricated lines of growth are finer.

11. PECTEN DUBIUS *Brocchi*. Tab. IV, fig. 3, and Tab. VI. fig. 3.

List. Hist. Conch., lib. iii, p. 1, fig. 29, 1687.
OSTREA DUBIA. *Broc*. Conch. Foss. Subap., p. 575, t. 16, fig. 16, 1814.
PECTEN SCABRELLUS. *Desh*. 2d ed. Lam., t. vii, p. 161.
— — *Bast*. Bord. Foss., p. 73, 1825.
— — *Goldf*. Pet. Germ., t. ii, p. 62, t. 95, fig. 5.
— — *Dujard*. Mem. Geol. de France, p. 270.
— — *Bronn*. Leth. Geog., ii, p. 917, t. 39, fig. 17, *a—c*, 1838.
— — *Grateloupe*. Cat. Zool. des An. Vert. et Invert. Bord., p. 58, 1838.
— — *Phil*. En. Moll. Sic., vol. ii, p. 60, 1844.
— MURICATUS? *Risso*. Princ. Prod. de l'Eur., t. iv, p. 304, 1826.
— VENTILABRUM? *Goldf*. Pet. Germ., t. ii, p. 67, t. 97, fig. 2.
— SOWERBYI. *Nyst*. Coq. Foss. de Belg., p. 293, pl. 22, fig. 3, *b*, and pl. 22 *bis*, fig. 3, *a'*, 1844.
— TUMESCENS. *S. Wood*. Catalogue, 1840.

Spec. Char. Testâ suborbiculari, æquilaterali, subæquivalvi, radiatâ, radiis 14—18 *sulcatis, plurimum tripartitis, squamoso-denticulatis; auriculis inæqualibus.*

Shell suborbicular, equilateral, slightly inequivalved, with 14—18 large and elevated rays for the most part, one large, with a small one on each side, strongly imbricated ears, unequal, rayed, and squamose.

Diameter, 1½ inch.

Locality. Cor. Crag, Sutton, Ramsholt, Sudbourn, Gedgrave.
Red Crag, Sutton, Newbourn, Bawdsey, Walton Naze.

This is by no means rare in the Coralline, but rather more so in the Red Crag; it is, however, much less abundant than *opercularis*, though it may generally be obtained in those localities in which the shells of either Formation are met with in a good state of preservation.

The valves of this species may be described as equal in size, at least, as far as can be determined by the disconnected valves, which appear to present a similar amount of convexity, although a specimen of the left valve may occasionally be seen a little more tumid or deeper than the right. The rays are fewer than in *P. opercularis*, never exceeding eighteen, while they have sometimes not more than fourteen, but the general amount is the intermediate number; these are tripartite, and about an equal width with the spaces between them; the centre ray is much larger than the one on each side of it, and is covered with large and prominent squamæ or imbrications, while the smaller rays are also scabrous, but have more numerous and smaller squamæ, not corresponding with those upon the larger ray as if they were not formed at the same time by the reflexed edge of the mantle. The spaces between the rays in the young shell are naked or free from longitudinal striæ, which, however, become ornamented as the shell increases with from one to three rough and radiating scabrous lines. The length of the shell in most specimens is equal to the height, but when it deviates from this regularity it is in the direction from the anterior to the posterior side, which becomes greater than from the umbo to the ventral margin. Its most distinguishing characters appear to be the inequality of the auricles, the anterior one being much larger than the posterior, particularly in its young state, and much exceeds the differences observable in *P. opercularis*. The spread of the auricles at the ligamental edge equals 3-5ths the diameter of the shell, while in some small specimens the hinge area is comparatively larger. On the right valve beneath the anterior auricle, as in the last species, are some prominent denticulations, and the exterior of the shell is also ornamented with fine divaricating striæ, visible only with the aid of a magnifier.

One variety of what I have considered as the young of this species, is rather peculiarly ornamented on the left valve, having every third ray more especially covered with large and elevated imbrications, while the two intermediate ones are nearly smooth upon the outer edge (t. vi, fig. 3).

12. PECTEN ISLANDICUS, *Müller*, Tab. V, fig. 1.

PECTEN	ISLANDICUS.	*Müll.* Zool. Dan. Prod., p. 248, No. 2990, 1776.
—	—	*Chem.* Conch. Cab., vii, p. 314, pl. 65, figs. 615-16, 1782.
—	—	*Brown.* Illust. Conch. Gr. Brit., pl. 33, fig. 3, 1827.
—	—	*Flem.* Brit. An., p. 385, 1828.
—	—	*Desh.* 2d ed. Lam., vii, p. 145, 1836.
—	—	*Gould.* Invert. Massach., p. 133, fig. 87, 1841.
—	—	*Möller.* Ind. Moll. Grœn., p. 16, 1842.
—	—	*G. Sow.* Thesaur. Conch., vol. i, p. 75, pl. 17, figs. 159-160, 1843.
—	—	*Dekay.* Nat. Hist. New York Zool., p. 173, pl. 11, fig. 206, 1843.
—	—	*Lovén.* Ind. Moll. Scand., p. 30, 1846.
—	—	*Chenu.* Conch. Illust. Pecten., pl. 32, figs. 1—4.
—	—	*Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 303, 1849.
—	—	*Middendorff.* Mem. de l'Acad. des Sci. St. Petersb., p. 526, t. 12, figs. 7-8, 1849.
—	—	*G. B. Sow., Jr.* Thesaur. Conch., vol. i, p. 75, pl. 17, figs. 159—161, 1847.
OSTREA	ISLANDICA.	*Gmel.* Syst. Nat., p. 3326, 1788.
—	—	*Turt.* ed. Linn., vol. iv, p. 267.
—	—	*Shaw.* Zool. Misc., vol. xxiii, t. 978, 987.
—	—	*W. Wood.* Ind. Test., p. 49, pl. 10, fig. 21, 1825.
—	CINNABARINA.	*Born.* Mus. Cœs. Vind., p. 103, 1780.
—	—	*Dillwyn.* Desc. Cat. Rec. Shells, p. 256, 1817.
PECTEN	PEALII.	*Conrad.* Amer. Mar. Conch., p. 12, pl. 2, fig. 2, (fide *Gould*).
		Ency. Method., pl. 212, fig. 1.
		Lister. Hist. Conch., pl. 1057, fig. 4.

Spec. Char. Testâ suborbiculari, æquilaterali, convexiusculâ, subæquivalvi, radiatâ, radiis numerosissimis, bisulcatis, scabriusculis; auriculis inæqualibus.

Shell suborbicular, equilateral, slightly convex, subequivalve, covered with numerous close-set, somewhat scabrous bisulcated rays or costulated striæ; auricles unequal.

Locality. Clyde Beds.

Recent, Scandinavia, Greenland, and North American Seas.

This handsome shell is rejected by British Conchologists, as a living inhabitant of our own Seas, it must necessarily, therefore, fall into the hands of the British Palæontographist, as a fossil species, it being abundant in the Clyde Beds. Dead valves have been dredged up in the Scottish and Zetland Seas, from depths varying from thirty to one hundred fathoms.

It is, essentially, a Boreal species, and is found living upon the Banks of Newfoundland, where it is said by Dr. Gould, to be the favorite food of fishes. I have not as yet seen a specimen from any of the three Formations into which the Crag has been separated, although fragments of what may belong to this species have been found in the Mammaliferous Crag, at Bramerton, and what were considered to

have been *P. Princeps*, by Woodward, were, probably, only portions of specimens of this shell which sometimes attains a magnitude of four inches in diameter, a size that might well lead to such an error.

Our figure is taken from a magnificent specimen found in the beds of the Clyde, and now in the Museum of the Geological Society, presented by James Smith, Esq., of Jordan Hill.

13. PECTEN VARIUS, *Linnæus.*

OSTREA VARIA.		*Linn.* Syst. Nat., ed. 12, p. 1146, No. 199, 1767.
—	—	*Poli.* Test. Sic., vol. ii, p. 163, t. 28, fig. 10, 1793.
—	—	*Don.* Brit. Shells, vol. i, pl. 1, fig. 1, 1799.
—	—	*Shaw.* Nat. Miscel., vol. 23, fig. 993.
—	—	*Mawe.* Linn. Conch., pl. 14, fig. 4, 1823.
—	—	*W. Wood.* Ind. Test., p. 50, pl. 10, fig. 31, 1825.
—	—	*Burrow.* Elem. Conch., p. 144, pl. 9, fig. 2, 1815.
PECTEN VARIUS.		*Chem.* Conch. Cab., vii, p. 331, pl. 66, figs. 633, 634, 1782.
—	—	*Crouch.* Int. Lam. Conch., p. 12, fig. 4, 1827.
—	—	*Brown.* Illust. Conch. Gr. Brit., pl. 33, fig. 4, 1827.
—	—	*Phil.* En. Moll. Sic., vol. i, p. 84, 1836.
—	—	*J. Smith.* Mem. Wern. Soc., vol. viii, p. 46, 1838.
—	—	*G. B. Sow.* Conch. Man., fig. 171, 1843.
—	—	*Id.* Thesaur. Conch., vol. i, p. 76, pl. 19, fig. 214, 218, 1847.
—	—	*Thorpe.* Brit. Mar. Conch., p. 118, 1844.
—	—	*Phil.* En. Moll. Sic., vol. ii, p. 58, 1844.
—	—	*Lovén.* Ind. Moll. Scand., p. 30, 1846.
—	—	*Alder.* Cat. Moll. North. and Durh., p. 77, 1848.
—	—	*Forb.* and *Hanl.* Hist. Brit. Moll., vol. 2, p. 273, pl. 50, fig. 1, 1849.
—	MONOTIS.	*Dacosta.* Brit. Conch., p. 151, pl. 10, figs. 1, 2, 4, 5, 7, 9, 1778.

Spec. Char. Testâ rotundato-ovatâ, æquivalvi, æquilaterali, radiatâ; radiis 26—30, *subcompressis, squamoso-scabris; auriculâ alterâ minimâ.*

Shell roundedly ovate, equivalve, equilateral, ornamented with 26—30 subcompressed rays, which are covered with squamose imbrications; ears unequal.

Locality. Clyde Beds. Recent, North Seas, Britain, and Mediterranean.

This is given by Philippi, as a living species in the Mediterranean, and enumerated by Lovén, as an inhabitant of the Coast of Scandinavia; but it has not yet, that I am aware of, been found in either of the three deposits of the Crag. As it is undoubtedly a fossil, in the Clyde Beds, and found frequently in the upper Tertiaries of Sicily, it may, probably, yet be discovered in the Red or Mammaliferous Crag in our own country. It would not, however, be here introduced simply upon such anticipation, but it is claimed as one of the fossils of our upper Tertiaries.

Lima,* *Bruguere*, 1797.

Plagiostomus. *Llwyd.* 1698.
Radula. *Chem.* 1784.
Glaucus and Glaucoderma. *Poli*, 1795.
Ostrea (sp.). *Linn.*
Mantellum. *Bolten*, 1798.
Pecten (sp.). *Mont.*
Plagiostoma. *J. Sow.* 1814.
Glaucion. *Oken.* 1815.
Limatula. *S. Wood.* 1840.
Limula. *D'Orb.* sec. *Gray.*

Gen. Char. Shell ovate, equivalved, generally oblique, inequilateral, and gaping at both sides; sometimes closed and equilateral, externally costated or striated, radiating from the umbo; often rough and squamous like a file. Hinge area extended into auricles, bipartite; cartilage occupying the central or triangular portion; ligament more external and linear. Palleal impression entire, that by the adductor muscle large, ovate, and eccentric.

The animal of this genus has the lobes of the mantle disunited, the margins fringed with long tentacular filaments, and without siphonal tubes. A small compressed foot furnished with a byssal groove.

Some species approach very closely to those of the genus Pecten, in being equilateral, and enclosing the animal within the shells when they are brought together; in others, the shells gape widely, both on the anterior and posterior sides, and the animal is too large to be covered by the valves. A subgenus was proposed by myself, for those species which are equilateral and closed (under the name *Limatula*); but recent examinations of the animals of both sections are said not to present differences sufficient to justify generic separation. They are, therefore, here united.

The name of *Limea* was proposed as a genus for those species which are furnished with teeth or crenulations upon the hinge margin on each side of the cartilaginous pit, and the name *Limoarca* was also given in consequence to the same section, but this character alone, it is to be feared, is not sufficient for generic separation; specimens of *Lima subauriculata* in my own cabinet, are in like manner supplied with minute crenulations. Dr. Loven, however, states the animal of his *Limea Sarsii* to have the margin of its mantle destitute of tentacular appendages. Species, probably belonging to this genus, from the older Secondary Formations figured and described under the name of *Plagiostoma*, have been long known, and were abundant in some of the older periods. In those shells the gape or opening appears to have been on the rounded or posterior side, on which, in the recent shell, is placed the large adductor muscle, while the foot, the organ that secretes the byssus, is on the anterior side, which appears to have been capable of being quite closed, the opening, therefore, was

* Etym. *limus* crooked, oblique; *lima*? a file.

not, probably, for the organ of attachment, and as in the recent species, their shells vary much in those characters, the secondary fossils were most likely of this genus.

1. LIMA EXILIS, *S. Wood.* Tab. VII, fig. 6, *a—c.*

LIMA EXILIS. *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 233, Sup., pl. 3, fig. 1, 1839.
— — *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. of Brit. Foss., p. 111, 1843.

Spec. Char. Testâ ovatâ, valdè obliquâ, depressâ, fragili, exili, utroque latere hiante; costato-striatâ, striis 25-35 *asperimis, undulatis; cardinis obliqui area angustâ; auriculis minimis æqualibus.*

Shell ovate, very oblique, somewhat depressed, slender, and fragile, gaping largely on both sides; striated or costated, striæ 25-35, rough, irregular and unequal, cardinal area large, oblique ears, rather small and equal.

Longitudinal diameter, 1¼ inch. *Height,* 1½ inch.

Locality. Cor. Crag, Ramsholt, Sudbourn.
Red Crag, Walton Naze.

This elegant shell does not appear to have been very scarce in the Coralline Crag Sea, having myself procured a dozen specimens, most of which were from one locality, Ramsholt; it is also occasionally found in the more tranquilly deposited portion of the Red Crag at Walton Naze, but its fragility in proportion to size is against its preservation in that deposit, as even in the older formation, specimens are not often obtained in a perfect state.

Messrs. Forbes and Hanley have introduced this fossil into their synonyma of *L. hians*, considering it only as a variety of that species, to which opinion I am not willing to assent as a marked and striking difference is presented by my fossils sufficient by the ordinary mode of valuation in specific distinction to justify a separation. It somewhat resembles *L. inflata*, but is flatter and undeserving of that name, and a shell in the British Museum called *L. scabrella*, approaches it in some respects, but that is also more inflated, and is probably a variety of the *inflata;* I have therefore retained it as distinct, being intermediate between the British and Mediterranean species, approaching rather nearer to the latter than to the former.

It may be more particularly described thus: the form is irregularly ovate, very oblique, gaping on both sides, and covered with raised and slightly undulating costulated striæ, these are rough or scabrous, at nearly regular distances, covering in some specimens the entire surface, but generally a small space is left naked on the anterior side; in *L. hians* the striæ are less regular, thicker on the posterior side, larger and more dissimilar on the anterior, in this they are rather more distant upon the posterior half; the comparative dimensions of this are very different, taking the height at 1½ inch from the umbo to the ventral margin, the diameter in the opposite direction is equal to 1¼ inch, but in *hians* the height is at

least one third greater than the length; the hinge line in this is more oblique, the ligamental area broader and more shallow, with a smaller gape on both sides. Two forms of the British shell have been figured by Professor Forbes in the 'Mag. Nat. Hist.,' one of which is less elongated than the other, and more nearly approaches our shell, but there is still apparently a sufficient difference to keep them separated.

2. LIMA HIANS, *Gmelin*. Tab. VII, fig. 2, *a—c*.

OSTREA HIANS. *Gmel.* Syst. Nat., p. 3332.
— — *Turt.* ed. Linn., vol. iv, p. 273, 1806.
— — *W. Wood.* Ind. Test., p. 51, pl. 11, fig. 53, 1825.
LIMA TENERA. *Turt.* Zool. Journ., vol. ii, p. 362, t. 13, fig. 2 (not *tenera Chem.*).
— — *Brown.* Illust. Conch. Gr. Brit., pl. 31, figs. 8, 9, 1827.
— — *Forbes.* Malac. Monen., p. 41, 1838.
— — *Id.* Report on Ægean Invert., p. 182, 1843.
— — *Phil.* En. Moll. Sic., vol. ii, p. 56, pl. 16, fig. 3, 1844.
— INFLATA. *Forbes.* Malac. Monen., p. 41, 1838.
— SARSII. *Kröyer*, fide *Lovén.*
— VITRINA. *Brown.* Illust. Conch. Gr. Brit., pl. 31, figs. 10, 11.
— FRAGILIS. *Flem.* Brit. Ann., p. 388, (partly,) 1828.
— — *Id.* Crouch. Corn. Faun., pt. 2, p. 37.
— APERTA. *G. B. Sow.* Thes. Conch., vol. i, p. 87, pl. 22, figs. 26 & 27, 1847.
— — *Thorpe.* Brit. Mar. Conch., p. 249.
— HIANS. *Lovén.* Ind. Moll. Scand., p. 32, 1846.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 268, pl. 52, figs. 3—5, and pl. R (animal), 1849.
— OBLONGA. *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 234, pl. 3, fig. 2, 1839.
LIMÆ. *Forbes.* Mag. Nat. Hist., vol. viii, pp. 593, 594, figs. 63 & 64, 1835.

Spec. Char. Testâ oblongo-ovatâ, obliquâ, valdè inæquilaterâ, depressâ, gracili, costato-striatâ, striis vel radiis numerosis, asperimis, irregularibus, cardine obliquo, area triangulari latâ, auriculis æqualibus; margine denticulato.

Shell elongato-ovate, oblique, very inequilateral, depressed, and slender; striated with numerous, rough, irregular, and slightly waved striæ, projecting beyond the ventral margin; gaping widely on the posterior side, slightly so on the anterior; ligamental area large and triangular, umbones prominent and distant.

Height, 1 inch. *Length*, 6-10ths of an inch.

Locality. Cor. Crag, Ramsholt.

Recent, Britain, Scandinavia, and Mediterranean.

This appears more scarce as a fossil than the preceding, having as yet obtained only two specimens, and those both of the same value, and from the same locality, there is, however, little doubt of its identity with the recent British species.

The form of this shell is comparatively much more elongated than the preceding, and is somewhat flatter; it gapes widely on both sides, that on the posterior is particularly deep immediately behind the hinge line, while the front gape is near the ventral

margin; the exterior is covered with numerous irregular striæ or striated costæ, rough or scabrous, radiating in an undulating direction, extending from the extreme edge of the posterior side to the anterior, where, for a small space, it is naked or destitute of striæ, those on the posterior are fine and closer set, becoming larger and more distant as they approach the anterior, where they are rough and project beyond the margin. The hinge line is less oblique than in *exilis*, and is narrower, which perhaps it would be, if not a different species, corresponding thus with the more narrow form of the shell, but the ligamental area is deeper from the umbo inwardly, while the gape on both sides is larger than in that shell, and the whole contour in this is so different that, judging from the specimens which I possess, they cannot be united without an extension of variation greater than is generally permitted to species of this genus.

In the recent state, in the more northern parts of the British seas, it attains a greater magnitude than is given by the dimensions of our fossil, which may not, possibly, be a full-grown individual, although its gape is wide, a character of the adult shell; it is said one inch and three quarters is not an uncommon size in the recent British specimens, whilst those found at Guernsey are less, resembling in this peculiar our Crag fossil.

3. LIMA LOSCOMBII, *G. Sowerby*. Tab. VII, fig. 1, *a—c*.

PECTEN FRAGILIS. *Mont.* (not *Chemnitz*). Test. Brit. Sup., p. 62, 1808.
OSTREA FRAGILIS. *Turt.* Conch. Dict., p. 131, 1816.
LIMA BULLATA. *Turt.* (not OSTREA BULLATA, *Born.*). Brit. Biv., p. 217, t. 17, figs. 4, 5.
— — *Thorpe.* Brit. Mar. Conch., p. 114, 1844.
— — *Phil.* En. Moll. Sic., vol. ii, p. 56, t. 16, fig. 2, 1844.
— LOSCOMBII. *G. Sow.* Genera of Shells, No. 17, LIMA, fig. 4.
— — *Reeve.* Conch. Syst., pl. 112, fig. 4.
— — *G. Sow.* Thesaur. Conch., vol. i, p. 86, pl. 22, figs. 20—22.
— — *Lovén.* Ind. Moll. Scand., p. 32, 1846.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 265, pl. 53, figs. 1—3.
— — *Alder.* Cat. Moll. North. and Durh., p. 78, 1848.
— FRAGILIS. *Brown.* Illust. Conch. Gr. Brit., pl. 31, figs. 6-7, 1827.
— — *Forbes.* Mag. Nat. Hist., vol. viii, p. 594, fig. 65.
— — *Id.* Malac. Monen. p. 40, 1838.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 235, pl. 3, fig. 3, 1839.

Spec. Char. Testâ tumidâ, oblique-ovatâ, inæquilaterâ, tenui, fragili; utroque latere perparvulum hiante, striatâ, striis tenuissimis, alternatis, undulatis, cardine obliquo.

Shell tumid, obliquely ovate, inequilateral, thin and fragile; very slightly gaping on either side, covered with fine striæ, slightly undulating, and alternately larger and smaller; cardinal area oblique and small.

Greatest Diameter, $\frac{3}{4}$ of an inch.

Locality. Cor. Crag, Sutton and Ramsholt.
Red Crag, Walton Naze.
Recent, Britain, Norway, and Mediterranean.

This elegant and fragile shell is by no means rare in the Coralline Crag at Sutton, but rather less so at Ramsholt. Walton Naze is the only locality in the Red Crag from which I have seen it. There cannot, it is presumed, be any doubt about the identity of this species, which does not seem to possess even a local variation.

The striæ which ornament this shell are sometimes regular in size, but more often possess an intermediate smaller one; there is a very slight opening between the valves, near the hinge line on the posterior side, and the valves do not quite close on the anterior side towards the ventral margin; hinge line rather short, with a large and broad ligamental pit projecting inwards; a subcircular impression by a large adductor muscle towards the convex or posterior side of the shell.

4. LIMA PLICATULA, *S. Wood.* Tab. VII, fig. 4.

LIMA PLICATULA. *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 235, pl. 3, fig. 4, 1839.

Spec. Char. Testâ minutâ, inæquilaterali, obliquè-ovata, compressiusculâ; costato-striatâ, striis 14—16 *convexis, scabriusculis; anticè rectâ, posticè rotundatâ; auriculis valdè inæqualibus; cardine obliquo; areâ ligamenti minutâ; in auriculis dentibus obtusis.*

Shell small, inequilateral, obliquely ovate, slightly compressed; costated or striated; striæ 14—16 rounded and somewhat scabrous; anterior side straight, posterior rounded; auricles very unequal; hinge line oblique; ligamental area small, with an obtuse tooth in the centre of the auricles.

Longest diameter, $\frac{1}{5}$th of an inch.

Locality. Cor. Crag, Sutton.

About a dozen specimens of this shell are in my cabinet, but none of them in very perfect condition; and I have not seen other specimens, since the publication of it in the 'Mag. Nat. Hist.,' to give further assistance in its elucidation. It appears, however, to present characters differing from any other species with which I am acquainted, and it must, for the present at least, be considered as distinct, and may be more particularly described thus.

The shell is very oblique; the anterior straight, sloping from the umbo with a scarcely perceptible auricle on that side; while the posterior is not only rounded, but has a comparatively large and projecting ear: it appears to have been able almost to close the valve, or at least to have had a very slight gape, as the edge of the shell nearly touches all round when laid upon a flat surface with its exterior uppermost; the rays are rounded, slightly scabrous, and numbering about 17 or 18, and these are somewhat broader than the spaces between them, which are prettily ornamented with elevated ridges, giving it a cancellated appearance. The hinge is rather peculiar, the central depression or pit being small and very oblique; and on each side in the middle of the auricles is a tooth-like projection with a corresponding depression in the opposite valve; a similar character may be observed in other species of this Genus, where interlocking prominences and depressions are formed by the animal as an

additional security against any injurious lateral movement of the valves. It appears to differ from *L. plicata* of the Touraine Beds in not being so elongated, and in having a broader ligamental area; and from *L. obliqua*, of the Paris Basin, in somewhat similar characters.

5. LIMA SUBAURICULATA, *Montague*. Tab. VII, fig. 3, *a—c*.

PECTEN SUBAURICULATA.		*Mont.* Test. Brit. Sup., p. 63, t. 29, fig. 2, 1808.
—	—	*Flem.* Edinb. Ency., pl. 205, fig. 12.
OSTREA SUBAURICULATA.		*Turt.* Conch. Dict., p. 131, 1816.
—	—	*W. Wood.* Ind. Test. Suppl., pl. 2, OSTREA, fig. 5.
LIMA	—	*Turt.* Brit. Biv., p. 218, 1822.
—	—	*Flem.* Brit. An., p. 388, 1828.
—	—	*Thorpe.* Brit. Mar. Conch., p. 114, 1844.
—	—	*G. Sow.* Thesaur. Conch., vol. i, p. 84, pl. 22, fig. 23.
—	—	*Phil.* En. Moll. Sic., vol. ii, p. 56, 1844.
—	—	*Lovén.* Ind. Moll. Scand., p. 32, 1846.
—	—	*Alder.* Cat. of Moll. North. and Durh., p. 78, 1848.
—	—	*Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 263, pl. 53, figs. 4, 5, 1849.
—	SULCATA.	*Brown.* Illust. Conch. Gr. Brit., pl. 31, figs. 4, 5, 1827.
—	—	*Möller.* Ind. Moll. Grœndl., p. 16, 1842.
OSTREA NIVEA.		*Broc.* Conch. Subap., p. 571, t. 14, fig. 14, 1814.
LIMA	—	*Risso.* Europ. Merid., t. iv, p. 306, 1826.
—	—	*Desh.* in Lyell's Princ., 1st ed, vol. ii, App., p. 12, 1833.
—	—	*Nyst.* Rech. Coq. Prov. d'Anv., p. 17, 1835.
—	—	*Phil.* En. Moll. Sic., vol. i, p. 78, 1836.
—	—	*Nyst.* Coq. Foss. de Belg., p. 281, pl. 21, fig. 4, 1844.
—	SULCULUS?	*Lovén.* Ind. Moll. Scand., p. 32, 1846.
—	ELONGATA.	*Forbes.* Ægean Invert., 1843, Rep. Brit. Assoc., p. 192.
LIMATULA SUBAURICULATA.		*S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 236, pl. 3, fig. 6, 1839.
—	—	*Morris.* Cat. of Brit. Foss., p. 111, 1843.

Spec. Char. Testâ elongato-ovali, æquilaterali, fragili, convexâ, in medio striatâ vel costatâ, striis rugosis, sæpè obtusè angulatis, mediis binis verticalibus; cardine recto; auriculis æqualibus.

Shell elongato-ovate, equilateral, convex, fragile, and closed all round; costated or striated in the centre, becoming obsolete at the sides; striæ or costæ rugose, sometimes angulated; hinge line straight; auricles equal.

Length, $\frac{1}{4}$; *height*, $\frac{1}{2}$ an inch.

Locality. Cor. Crag, Sutton and Ramsholt.

Recent, Britain, Norway, and the Ægean Sea.

Small specimens of this species are by no means rare in the Coralline Crag at Sutton; this place and Ramsholt are the only two localities from which it has as yet been obtained; and there is no doubt about its identity with the recent British species.

Our shell is not strictly ovate, but more of an oblong form, with the angles rounded off; the sides being somewhat straight, or of very gentle curvature, it is tumid and thin; the whole of the ribs being visible on the inside, they occupy the centre of the shell, and are distributed over about half the surface, two or three of the middle ones being the most distinct, and these are more conspicuously so on the inside; umbones prominent and divergent, leaving a wide ligamental area between them, thereby enabling the animal considerably to divaricate the valves; costæ obtusely angulated, rough, but not imbricated, showing distinct lines of growth; hinge-line straight; cartilage pit concave, projecting inwardly, forming an angle of 90°, and occupying nearly half the ligamental area. The shell extends on each side of the umbo into what are called auricles, the greater part of which space is occupied by the ligament; on the inside beneath these auricles the shell is thickened and strengthened by a prominent ridge, diverging from beneath the umbo towards the sides: in some specimens may be seen the impression of the large adductor muscle inclining towards the centre; my largest specimens do not exceed half an inch, measuring from the umbo to the ventral margin, and the transverse diameter about half that size.

A specimen from the Ægean Sea was given to me by Professor E. Forbes, with the name of *L. elongata*, which so much resembles some of the Crag specimens (fig. 3, *c*), that I have introduced the name among the synonyma. In the Ægean shell, which was obtained from the depth of 100 fathoms, the costated striæ are in number about 20, more distinct and distant on the centre or convex portion, and of course widest near the margin, not rounded but angulated; while in the generality of specimens of *subauriculata* they are rounded, but the same characters of sharpened costæ are visible in some of the Crag specimens, and there is not a distinction between the two sufficient, in my opinion, for specific separation; probably with a large number of individuals of the Ægean shell, as much difference might be detected as is exhibited in my Crag specimens.

Upon some of the smaller and most perfect specimens of this species from the Crag, may be observed a row of fine crenulations, occupying the entire edge of the hinge-line (fig. 3, *b*), being a miniature representation of what has been considered a good generic character; these are, however, so small as to be of little service for the ordinary purposes in which the teeth or prominent portions of the shell about the hinge are employed by the animal.

LIMA OVATA, *S. Wood.* Tab. VII, fig. 5.

LIMATULA OVATA. *S. Wood.* Mag. Nat. Hist., New Series, vol. iii, p. 235, pl. 3, fig. 5, 1839.

Spec. Char. Testâ minutâ, ovatâ, æquilaterâ, undiquè clausâ, inflatâ; in mediis costatis, utrinque obsoletis, costis angulatis circa septem; cardine recto, foveo ligamenti trigonâ, concavâ.

Shell small, ovate, equilateral, tumid, and closed, costated, central portion with 7-9 angulated ribs, becoming obsolete or disappearing on the sides; hinge margin straight, with a trigonal and concave pit for the cartilage.

Height, $\frac{3}{20}$. *Length*, $\frac{1}{10}$. *Depth of united Valves*, $\frac{1}{10}$ of an inch.

Locality. Cor. Crag, Sutton.

This pretty little shell is very abundant in the Coralline Crag, at the above locality.

It appears to be quite distinct from the preceding, and differs in several characters, and there is no species recent or fossil known to me to which it can be assigned.

It has about seven angularly formed costæ, which occupy the central portion of the dorsal area, beyond these are faint traces of striæ, and in well preserved specimens the shell is semi-transparent, rendering these ribs visible in the interior, and giving about half a dozen rough crenulations to the ventral margin of the shell.

The ligamental area is large, and the central pit diverges from the umbo under an angle of about 80°, muscular impression subcentral and ovate. It differs from any of the specimens of the preceding species of the same size, in being thicker and more regularly ovate, the ventral margin is more pointed, the sides are less straight, while the costæ are more prominent and distinct. I have not seen *L. sulculus*, Leach and Lovén, but the descriptions do not accord with our Crag shell, as it wants the "mediis binis verticalibus," mentioned by the latter author, but which character may be seen in specimens of *L. subauriculata*.

Pinna.* *Linnæus.*

Pinna. *Arist. Aldrov. List. Linn. Lam., &c.*
Pennaria. *Browne*, 1756.
Chimæra et Chimæroderma. *Poli.*, 1795.
Perna. *Adans*, 1757.
Oxysma? *Rafinesque*, 1819.
Curvula. *Id.*
Atrina. *Gray*, 1840.

Generic Character. Shell equivalved, inequilateral, oblique, triangular or wedge-shaped, generally thin and fragile; umbones terminal, hinge rectilinear, without teeth; anterior margin sinuated and slightly gaping for the passage of a byssus; posterior truncated. Impression by the mantle entire; ligament internal.

Animal triangular, in conformity with the shape of the shell; its mantle open or disconnected on all sides, except the dorsal edge, while its lobes line the whole interior of the valves; the lobes are ornamented with a double row of tentacular

* Etym. πίννα, *Arist.*, a kind of Pearl Oyster.

cirrhi or fringes round their posterior part; and a single row upon the anterior; foot somewhat small and slender, furnished with a byssal groove; no projecting siphonal tubes.

Animals composing this genus have their valves particularly thin, considering their dimensions, which sometimes attain considerable magnitude. In the recent state they are generally of a brownish or horny colour, which with their angular form have obtained for them, in France, the vulgar name of jambonneaux, or little hams. The shell gapes slightly at the anterior part near the beaks, through which is protruded a set of fibrous threads or byssus, so long as to have been occasionally manufactured into gloves and stockings. They are exclusively marine, having a range in depth somewhat considerable, living often in sand or mud, with their beaks or pointed extremity buried deep in the ground; sometimes fixed to submarine bodies, by means of the byssus, which it is said to be capable of displacing at will by the aid of its foot. The two valves are closely united or soldered, as it were, together, along the dorsal edge, and are incapable of much expansion, but they gape widely at their larger or posterior extremity, opposite the beak.

The number of recent species is somewhat limited, although they have a very wide geographical distribution, being found in most parts of the world, and the fossil species date as far back in time as the Oolitic Period, from which Formation there is one strongly resembling an existing form.

1. PINNA PECTINATA (?) *Linnæus.* Tab. VIII, fig. 11.

PINNA PECTINATA. *Linn.* Syst. Nat., ed. 12, No. 264, p. 1160, 1767.
— — *Turt.* Brit. Biv., p. 223, pl. 19, fig. 1, 1822.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 255, pl. 43, figs. 1, 2, and pl. 53, fig. 8, 1849.
— INGENS. *Mont.* Test. Brit., pp. 180, 583, and Sup., p. 72.
— — *S. Wood.* Catalogue, 1840.

A few fragments or imperfect specimens of a species of this genus have been obtained by myself from several localities in the Coralline Crag, but they are not in sufficiently good condition for instituting a fair comparison; what there is of them seem to present recognisable characters, and to correspond with those of the above-named recent species, and may, at least for the present, be considered as identical. In my Catalogue it was placed under the name of *P. ingens*, Mont., which the authors of the 'Hist. of Brit. Moll.' have determined to be only a variety of *pectinata;* the spiny or scaly sculpture of that shell being generally removed by abrasion as it advances in age.

In the small portion of what remains of our fossil, the radiating lines cover about half the shell, or from the dorsal edge extending into the middle of the valve; the ventral portion being sinuated and much thickened at the edge where the presumed byssus protruded, and the exterior is on that side ornamented with subconcentric or

wavy undulations, like those visible upon the recent shell. This species, in the recent state, is one of our largest bivalves, and Montague says they are not uncommonly a foot in length. The specimen to which our fragment belonged, probably did not exceed half that size. The same authority states, p. 181, "We discovered a bed of these shells in Salcomb Bay, in Devonshire, where they are called by the fishermen French muscles or scallops. They lie on a gravelly bottom, covered with mud and long sea-weeds, and are only to be got at particular times when the sea recedes further than usual." This shell in its living state is of a sort of double composition, the thin and broadest, or outer portion, being of a brown and somewhat horny texture, while the thickened lining, or anterior portion, is of a nacreous substance, composed of fibrous filaments, causing the shell in the fossil state to separate readily at that part in a transverse direction; and pieces of this 'fibrous shell' are often met with in the Coralline Crag at Sutton, separating like finely attenuated glassy filaments.

Avicula,* *Klein*, 1753.

Pteria. *Scopoli*, 1777, sec. *Gray*.
Ripariæ (sp.). *Gevers*, 1787. *Id.*
Margaritifera (sp.). *Humph.*, 1797.
Anonica. *Oken.*, 1815.
Perlamater (sp.). *Schum.*, 1817.

Generic Character. Shell inequilateral, inequivalve, oblique; upper or left valve the larger or more tumid; the lower or right valve with an opening for the passage of a byssus; surface sometimes smooth, at others ornamented with squamose appendages, or furnished with radiating costæ; hinge-line rectilinear, often with the posterior extremity prolonged into the form of an extended wing; one obtuse tooth in each valve; paleal impression without a sinus; ligament external.

Animal triangular; the edges of the mantle disunited, and the margins fringed with small tentacles; foot small, subcylindrical, beneath which is a byssal groove; no syphonal tubes.

1. Avicula tarentina? *Lamarck.*

Mytilus hirundo. *Linn.* Syst. Nat., ed. 12, p. 1159 (in part).
— — ? *Poli.* Test. Utr. Sic., vol. ii, p. 221, t. 32, fig. 17, 1795.
Avicula hirundo. *Turt.* Brit. Biv., p. 220, pl. 16, figs. 3, 4, 1822.
— aculeata. *Risso.* Hist. Nat. des Princ. Prod. de l'Eur., t. iv, p. 308, 1826.
— Atlantica. *Brown.* Illust. Conch. Gr. Brit., pl. 10*, fig. 6, 1827.
— Anglica. "*Leach.*" *Id.* - - pl. 31, fig. 3.
— Tarentina. *Lam.* Hist. des An. S. Ver., t. vi, p. 148, 1818.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 251, pl. 42, figs. 1—3, and pl. S., fig. 4, 1849.

* Etym. *Avicula*, from its resemblance to a Bird's wing.

Two fragments were found by myself in the Coralline Crag at Gedgrave, which belong undoubtedly to this genus, and as far as can be determined from their mutilated condition, appear to be of the above-named species; they are introduced here provisionally until better specimens be procured than what I possess: my specimens of the left valve have an obtuse tooth immediately under the beak within the ligamental margin, and are beautifully nacreous within. The area for the ligament appears somewhat larger than is shown by the recent shell.

MYTILUS,* *Linnæus*, 1758.

MYTULUS. *Rondelet*, 1555, sec. *Herrm.*
MUSCULUS. *List.* 1687.
MITULUS. *Browne*, 1756.
PERNA (sp.). *Adans*, 1757.
Id. *Schum.*, 1817.
CALLITRICHE et CALLITRICODERMA. *Poli.*, 1795.

Generic Character. Shell equivalve, inequilateral, oblique, elongate, wedge-shaped or subtriangular, more or less tumid, sometimes thin and semitransparent, occasionally thick and opaque: in the recent state covered with an epidermis: umbones acute, terminal; hinge slightly denticulated; surface generally smooth, sometimes striated. Ligament linear, internal. Muscular impressions two, unequal, anterior one near the umbo, elongate, posterior one suborbicular near the posterior part of the ventral margin; palleal impression without a sinus and rather obscure.

Animal elongate, with the lobes of the mantle partly fringed, disconnected except at the posterior, where there is a short anal siphon: adductor muscles very unequal; a cylindrically formed foot furnished with a gland and groove.

Animals belonging to this genus are inhabitants of salt-water or estuaries, and are generally very littoral in their habits; the common Mussel, as is well known, is more often found where it is deserted by the retiring tide, but some are inhabitants of the sea at a considerable depth. The living species are found in various parts of the world, and in the fossil state have been obtained as low in the secondary series as the Cornbrash.

MYTILUS EDULIS, *Linnæus.* Tab. VIII, fig. 9, *a—e.*

MUSCULUS SUBCÆRULEUS. *List.* Hist. Conch., lib. iii, fig. A, 200, 1687.
MYTILUS EDULIS. *Linn.* Syst. Nat., ed. 12, p. 1157, No. 253, 1767.
— — VULGATISSIMUS. *Chem.* Conch. Cab. viii, p. 169, t. 84, figs. 750, 751, 755.
— PELLUCIDUS. *Penn.* Brit. Zool., ed. 4, vol. iv, p. 112, pl. 63, fig. 75.
— VULGARIS. *Da Costa.* Brit. Conch., p. 216, pl. 15, fig. 5, (left-hand fig.)
— INCURVATUS. *Penn.* Brit. Zool., pl. 64, fig. 74.
— ELEGANS. *Brown.* Illust. Conch. Gr. Brit., pl. 29, figs. 14, 15, 1827.

* Etym. μυτίλος (deriv. a μῦς, as ναυτίλος a ναῦς).

MYTILUS FLAVUS. *Poli.* Test. Sic., vol. ii, p. 207, pl. 32, fig. 4, 1795.
— SAGITTATUS. *Id.* - - - 208, - figs. 2, 3.
— UNGULATUS. *Id.* - - - 209, - fig. 5.
— GALLOPROVINCIALIS. *Desh.* 2d ed. Lam., t. vii, p. 46.
— ABBREVIATUS. *Id.* - - - p. 47, No. 30.
— RETUSUS. *Id.* - - - p. 48, - 31.
— BOREALIS. *Dekay.* Nat. Hist. New York Zool., p. 182, pl. 13, fig. 222.
— DILATATUS. *W. Wood.* Ind. Test. Sup., pl. 2, MYTIL., fig. 2.
— SUBSAXATILIS. *Williamson.* Mag. Nat. Hist., 1834, vol. vii, p. 354, fig. 48, *a—d*
— ANGULATUS. *Alder.* MSS., fide *Williamson.*
— SOLITARIUS. *Rev. W. Mark.* MSS. *Id.*
— NOTATUS. *Dekay.* Nat. Hist. New York Zool., p. 182, pl. 13, fig. 223, 1843.
— ANTIQUORUM. *J. Sow.* Min. Conch., t. 275, figs. 1-3, 1821.
— — *Desh.* 2d ed. Lam., vii, p. 54, 1836.
— — *Nyst.* Rect. Coq. Foss. Prov. d'Anv., p. 17, No. 66, 1835.
— — *Phil.* En. Moll. Sic., vol. i, p. 73, and vol. ii, p. 53.
— — *Nyst.* Coq. Foss. de Belg., p. 267, pl. 21, fig. 1, *a—b.*
— — *Basterot.* Mem. Geol. des Env. de Bord., p. 78, 1825.
— — *Woodward.* Geol. of Norf., p. 44, t. 2, fig. 20, 1833.
— ALÆFORMIS. *J. Sow.* Min. Conch., t. 275, fig. 4, 1821.
— — *Woodward.* Geol. of Norf., p. 44, 1833.
— AFFINIS. *Bean.* MSS. (not *Sowerby*).
— PLEBEIUS? *Dubois de Montp.* Conch. Foss. de Wolhyn. Podol., p. 69, pl. 7, figs. 26-28, 1831.
— EDULIS. *Brocchi.* Conch. Foss. sub. Apen., p. 584, 1814.
— — *Bast.* Mem. Geol. des Env. de Bord., p. 79, 1825.

Spec. Char. Testá elongato-trigonulá, lævigatá; anterius curvá, subangulatá; posterius retusá; versus basim tumidá; dentibus tribus vel quaternis.

Shell elongate, of a subtrigonal form, smooth, anterior part curved, subangulated, posterior obtuse, tumid towards the base, hinge with three or four denticles.

Greatest diameter, 4 inches.

Locality. Red Crag, Sutton, Bawdsey, Ipswich.
Mam. Crag, Bramerton, Bridlington.
Recent, Mediterranean, Britain, Scandinavia, and North America.

The true edible species is first seen in the Red Crag Deposit, and is found in some places, as might be expected, in great abundance, but the specimens have become so thin and fragile, as to be with difficulty procured entire.

What is considered as the normal form of this species, by Messrs. Forbes and Hanley, is that variety which has been erected into a distinct species by Mr. Williamson, under the name *subsaxatilis.* In this the shell is more angular, and the posterior portion becomes broader, its solitary habits giving free scope to an expansion at that part, and enabling it to assume what may be called its natural shape. This variety has not been met with by myself in the Red Crag, but it is by no means uncommon in the deposit at Chillesford which rests upon it, and which probably belongs to the mammaliferous or more recent period, and where it is the only

form of this species, the other varieties have all been obtained from the older formation.

The ligament of this is placed within the margin of the shell, although slightly visible externally, when the valves are closed, it extends the entire length of the dorsal edge, and a considerable scope is given to the dilatation of the valves; four small teeth are placed on the anterior side of the umbo interlocking each other; these teeth are always visible, though somewhat variable in their character, the anterior one being sometimes the larger, and *vice versâ*. In the increase of the valves a slight curvature is given to the umbo by the retrocession or retreating of the ligament: while fresh layers are deposited on the anterior margin, three small ridges are left upon the exterior, indicating the form and position of these teeth, which are produced internally by the indentures of the exterior. A small but deeply-seated muscle mark is visible on the anterior side, or immediately beneath the umbo, and a large subcircular one a little within the posterior part of the ventral margin. Mr. Alder says, "no species undergoes a greater degree of variation from locality than the common Mussel. For its full development, a mixture of fresh with salt water appears to be necessary, it is therefore met with in the greatest perfection at the mouths of rivers. In such localities the typical form of the species is to be found, and when left undisturbed usually forms large beds. On the more rocky and exposed parts of the coast it assumes a stunted appearance, running into the varieties of form mentioned above, always small on the exposed surface of rocks, but attaining a larger size in hollows and crevices."

In the Estuary Deposit of the Eocene Period, at Colwell Bay, as well as upon the opposite side of the Solent at Hordwell, is found a species of Mussel (*M. affinis*, 'Min. Conch.,' T. 532, fig. 1), which very much resembles the var. *pellucidus* of this species, but it is decidedly more carinated, and wants the denticles so conspicuous in the common edible Mussel, near the umbo; and notwithstanding the extraordinary range in variation assumed by this species, there is, I think, no doubt of the two shells being specifically distinct; a specimen from Bridlington, with this name, was obligingly sent to me for description by Mr. Bean, but there is every reason to believe it is only a variable form of our common Protean shell.

It is, in general, of littoral habits, being often found in the living state where left dry by the retiring tide, and as such, indicative of shallow water, although it is occasionally met with at considerable depth. Its geographical range is very great, being undoubtedly an inhabitant of the Mediterranean, as well as of the coast of the United States of America, and in both of which extremes of longitude it appears to be subject to the same variable character. This is a long known species, descriptions or figures of the recent shell having been given by almost every author, ancient or modern, who has ventured to describe a shell; and in order to show its range in variation, a list of names is introduced, under which it has been described, presuming all to belong to one and the same species, a single example of each name being considered sufficient for the living shell.

2. MYTILUS HESPERIANUS, *Lamarck*. Tab. VIII, fig. 10.

MYTILUS HESPERIANUS. *Lam.* Hist. des An. Sans. Vert., t. vi, p. 127, 1819.
— — *Desh.* 2d ed. Lam., t. vii, p. 48, 1836.
— — *Payr.* Cat. Moll. Cors., p. 68, pl. 2, fig. 5, 1826.
— DENSATUS. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ elongatâ, obliquâ, incurvatâ densatâ, crassâ; margine dorsali arcuatâ.

Shell elongate, oblique, incurved, thick and heavy; dorsal margin convex.

Greatest Diameter, $2\frac{1}{2}$ inches.

Locality. Cor. Crag, Sudbourn. Recent, Mediterranean, and Coast of Spain.

Two specimens only of this shell have yet come into my possession, and these are both of the right valve, and as they are all that I have seen, it does not appear to have been abundant during the Cor. Crag period. Fragments of a very thick Mussel, indicating a considerable curvature, and which I presume to belong to this species, are not unfrequently met with in various parts of the Red Crag; and as they have undergone a considerable deal of bouldering, may possibly have been washed out of the deposit of the antecedent period. I have given it therefore as a certain inhabitant of the older formation only.

It appears to present characters different from any of the varieties of the common edible Mussel, sufficiently it is presumed to entitle it to be considered a distinct species. The variety called *Myt. incurvatus*, Mont., approaches nearest in form, but the dorsal margin is never so convex as in our shell, and the specimens I have seen are much thinner. The Crag shell is very thick, more especially in the narrow part near the beaks, and the anterior side curves inwardly, while the dorsal and posterior portions are particularly convex in outline; the umbones are eroded, and the outer part of the shell near the beaks is so thin as to show the white lining through it, while towards the ventral portion the shell is of a deeper colour, as described by Payraudeau. My specimens are destitute of hinge-teeth, but their probable habitat in deep and more tranquil water may have rendered such unnecessary, and they may have thus become obsolete.

MODIOLA,* *Lamarck*, 1801.

VOLSELLA. *Scopoli*, 1777, sec. *Gray*.
CALLITRICHE et CALLITRICHODERMA. *Poli.*, 1795.
AMYGDALUM. *Megerle*, 1811.
CRENELLA. *Brown*, 1827.
BRACHYDONTES. *Swains.*, 1840.
LANISTES. *Id.* 1840.
MODIOLARCA. *Gray*, 1840.
MODIOLARIA. *Beck*, sec. *Loven*, 1846.
LANISTINA. *Gray*, 1847.
MODIOLOPSIS? *Hall*, 1847.

* Etym. *Modiolus*.

Generic Character. Shell equivalve, inequilateral, irregularly and roundedly trapezoidal; valves sometimes smooth or slightly sulcated concentrically; sometimes entirely covered with radiating striæ, sometimes the central portions smooth with the lateral extremities striated; anterior side very short; umbo subterminal; hinge margin linear, generally smooth, occasionally crenulated or denticulated; ligament internal; impressions of the adductor muscles different in form and unequal in size; anterior one small and elongato-ovate; posterior one large and subcircular; impression of the mantle entire; shell slightly gaping for the passage of a byssus.

Animal of the form of the shell, and the margins of the mantle without a fringe: an elongated and cylindrical foot, with a gland at its base for the formation of a byssus.

This genus has by some conchologists been united with the preceding one, in conquence of some similarities between the animals as well as the shells. In this the animal differs in having a simple margin to its mantle, as well as a marked peculiarity in the branchial region, these characters are as distinct as are generally employed for the separation of genera, and in the shells the anterior side is always more or less pushed beyond the umbo, so as to give it a less triangular or a more trapezoidal form than in Mytilus. The aberrant species will, it is true, bear a close generic resemblance, and the line of demarcation is difficult to define, but the same may be said of most proximate genera. Some modern conchologists have constituted a new genus for those species which are externally ornamented or striated, a character here considered insufficient for generic distinction, more especially as in well-determined species of the preceding genus the shell is sometimes smooth, while in others it is covered with deep and strongly marked lines of radiating striæ.

It is doubtful also whether a line of crenulations upon the dorsal edge of the shell is a character sufficient alone for generic distinction. The genera *Crenella* and *Modiolarca* have therefore been included in the synonyma. Animals of this genus generally spin a byssus, by which they are attached, and the shell gapes a little at the anterior part of the ventral margin for its passage; several species in the recent state supply this material so largely, as to wholly invest the shell in a kind of nest; while others closely resembling this genus are capable of forming a habitation in the interior of calcareous rocks. (*Mytilus lithophagus*, Linn.)

This is truly a Marine genus, and found at various depths, and is known among the oldest of the Secondary Rocks; but it is rather sparingly distributed throughout the Tertiaries.

1. MODIOLA MODIOLUS, *Linnæus*. Tab. VIII, fig. 1, *a—d*.

MYTILUS MODIOLUS.		*Linn.* Syst. Nat., ed. 12, No. 256, p. 1158, 1767.
—	—	*Da Costa.* Brit. Conch., p. 219, t. 15, fig. 5, 1778, (right-hand fig.)
—	—	*Chem.* Conch. Cab., vol. viii, p. 178.
—	—	*Donov.* Brit. Shells, vol. i, pl. 23, 1799.
—	—	*W. Wood.* Ind. Test., p. 53, pl. 12, fig. 31, 1825.
—	—	*Müll.* Zool. Danica, pl. 53.
—	—	*Flem.* Edin. Ency., vol. vii, pl. 203, fig. 22.
—	CURTUS.	*Penn.* Brit. Zool., p. 112, pl. 64, fig. 76, *a*.
—	CURVIROSTRATUS.	*Da Costa.* Brit. Conch., p. 220, 1778.
—	UMBILICATUS.	*Penn.* Brit. Zool., ed. iv, vol. iv, p. 112, pl. 65, fig. 76.
—	—	*Mont.* Test. Brit., p. 164, 1803.
—	—	*W. Wood.* Ind. Test., pl. 12, fig. 49, 1829.
—	BARBATUS.	*Don.* Brit. Shells, vol. ii, pl. 70, 1800.
—	PAPUANUS.	*Nyst.* Coq. Foss. de Belg., p. 271, 1844.
MODIOLA	PAPUANA?	*Desh.* 2d ed. Lam., t. vii, p. 18.
—	—	*Brown.* Brit. Conch. Illust., pl. 29, figs. 1—4, 1827.
—	—	*Say.* Amer. Conch., pl. 45.
—	—	*Leach.* Zool. Miscel., vol. ii, p. 33.
—	MODIOLUS.	*Turt.* Brit. Biv., p. 199, pl. 15, fig. 3, 1822.
—	—	*S. Wood.* Catalogue, 1840.
—	—	*Dekay.* Nat. Hist. New York Zool., p. 185, pl. 24, fig. 257, 1843.
—	—	*Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 182, pl. 44, figs. 1, 2, 1849.
—	—	*Midd.* Malac. Ross., loc. cit., p. 537, 1849.
—	VULGARIS.	*Flem.* Brit. An., p. 412, 1828.
—	—	*Lovén.* Ind. Moll. Scand., p. 33, 1846.
—	—	*Alder.* Cat. Moll. North. and Durh., p. 81, 1847.
—	GRANDIS.	*Phil.* En. Moll. Sic., vol. ii, p. 51, t. 15, fig. 13, 1844. Ency. Meth., p. 219, fig. 1.

Spec. Char. Testâ oblongo-ovatâ, gibbâ, lævigatâ; margine dorsali antico brevissimo; postico producto, subrecto; margine ventrali subsinuato; extremitate utraque rotundato.

Shell oblong-ovate, tumid, and smooth; anterior dorsal margin very short; posterior much produced, with hinge-line nearly straight; ventral margin subsinuated, and both extremities rounded.

Locality. Cor. Crag?

Red Crag, Sutton.

Mam. Crag, Postwick, Bridlington.

Recent, Britain, N. Seas, Boreal, America, Mediterranean?

A few specimens only of this fine shell have been found by myself in the Red Crag, where it does not appear to have been abundant, although occasionally fragments have been met with at distant localities, testifying its somewhat general distribution in that deposit; a few fragments also of a *Modiola* of a similar form are in my cabinet from the Coralline Crag at Ramsholt, but the hinge-line being imperfect, I am unable to

determine its specific character, and it was introduced into my Catalogue as belonging with doubt to this species.

In the recent state this shell is thick and strong, but my specimens differ materially in that character, and are particularly fragile. This species exhibits a very considerable degree of variation in its outward form or proportional dimensions, as may be observed in the specimens figured, but a similar variability is shown in the living shell: the two forms may be considered as belonging to one species, and there can be little doubt of its identity with the shell now common in our own seas. My specimens were all found at one locality in association with a bed of *Myt. edulis*. British Conchologists give it vertical range from low water mark to sixty fathoms.

I have introduced as a synonym *M. grandis Phil.*, believing it not to differ specifically from the British shell: some fossil specimens from Sicily (for which I am much indebted to Madame Power) in my cabinet, presumed to be the same as Philippi's species, have no character whereby they can be justly separated from the shell found upon the coast of Massachusetts. The size of the Mediterranean fossil is not sufficient for specific distinction, as a specimen of *modiolus*, measuring seven inches, is recorded by Captain Brown to have been obtained by a fisherman near the Bell Rock, on the coast of Forfarshire.

2. MODIOLA BARBATA, *Linnæus*. Tab. VIII, fig. 2.

MYTILUS BARBATUS.	*Linn.* Syst. Nat., ed. 12, p. 1156, sec. *Forb.* and *Hanl.*
—	—	*Poli.* Test. Sicil., vol. ii, p. 210, pl. 32, figs. 6, 7, 1795.
MODIOLA BARBATA.	*Lam.* Hist. des An. Sans. Vert., t. vi, p. 114, 1818.
—	—	*Phil.* En. Moll. Sic., vol. i, p. 70, and vol. ii, p. 50.
—	—	*Forbes.* Report. Ægean Invert., p. 180, 1843.
—	—	*Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 190, pl. 44, fig. 4.
—	GIBBSII.	*Leach.* Zool. Misc., vol. ii, p. 34, pl. 72, fig. 2, 1815.
—	—	*Turt.* Brit. Biv., p. 200, 1822.
—	—	*Brown.* Brit. Conch. Illust., pl. 29, fig. 7, 1827.
		Ency. Meth., pl. 218, fig. 6.

Spec. Char. Testâ tenui, ovato-oblongâ, extremitate compressiusculâ, anticè brevissimâ, posticè dilatatâ, subangulatâ; lineis incrementibus ornata.

Shell thin, of an oblong-ovate form, posterior portion somewhat compressed, dilated and sub-angulated, anterior extremity very short, concentrically striated, or lines of increase distinct and prominent.

Locality. Red Crag, Walton Naze. Recent, British and Mediterranean Seas.

About half a dozen specimens from the Red Crag, at Walton on the Naze, appear precisely in form to resemble what the authors of the 'Hist. of Brit. Mollusca,' seem to consider as entitled to specific distinction, and presuming they have good data for their determination, I have separated this from where it had been previously placed,

as only a variety of *M. modiolus*. A greater curvature in the ventral margin, and the expansion on the posterior side, are deviations from the ordinary form of the larger and more common species, and these are, I presume, the principal characters relied upon for separation. On the exterior are a series of ridges or elevated lines of growth, the probable remains of the support of the bearded or fringed portion of the epidermis when in a recent state. The beaks in this specimen appear to be terminal, the anterior side of the shell not projecting beyond them, and in that character more resembling *Mytilus*, which it closely approaches in form; there is, nevertheless, a projection outwards, like the rest of the genus. The ventral margin is somewhat incurved, the dorsal portion of the shell a good deal flattened behind, and extending beyond the ligamental area, while the centre is tumid or inflated; the dimensions of the widest part, which is on the posterior side behind the ligament, is twice that of what it measures across the shell immediately behind the umbo.

3. MODIOLA PHASEOLINA, *Philippi*. Tab. VIII, fig. 4.

MODIOLA PHASEOLINA. *Phil.* En. Moll. Sic., vol. ii. p. 51, t. 15, fig. 14, 1844.
— — *Jeffreys*. An. Nat. Hist., vol. xix, p. 313.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 186, pl. 44, fig. 3, 1849.

Spec. Char. Testâ oblongo-ovatâ, lævigatâ, tenui, margine ventrali recto; subsinuato, dorsali subangulato, cardine crenulato.

Shell oblong-ovate, smooth and thin; ventral margin straight or subsinuated, dorsal margin subangulated; cardinal area crenulated: shell nacreous.

Locality. Coralline Crag, Sutton, and Ramsholt.

Recent, Britain, and Mediterranean.

The distinguishing character of this species appears to be the finely crenulated margin of the dorsal edge on the outside of the ligamental area, as the outer form or contour of the shell is variable like *M. modiolus*, from the young of which it could not be separated by any character which might not also be applied to that species; some specimens have but a short hinge line, with a somewhat rounded dorsal edge, and a subcylindrical or ovato-oblong outline, while in others there is a considerable angle on the dorsal edge at the posterior termination of the ligament, and the ventral margin is nearly straight, varying sometimes from that line a little, both outwardly and inwardly. The largest specimens which have a minutely crenulated hinge line do not exceed $\frac{3}{8}$ths of an inch, and all show a pearly texture. The umbo is generally terminal, although the anterior side will occasionally be seen to project beyond it.

This, as well as the preceding species, have been introduced in deference to the Malacologists, but it is very doubtful if they will not hereafter have both to be united with *M. modiolus*.

4. MODIOLA COSTULATA, *Risso.* Tab. VIII, fig. 6.

MODIOLUS COSTULATUS. *Risso.* Hist. Nat. de l'Europ. Merid., t. iv, p. 324, pl. xi, fig. 165, 1826, non bene.

MODIOLA COSTULATA. *Phil.* En. Moll. Sic., vol. i, p. 70, t. 5, fig. 11, 1836.

— — *Id.* - - - vol. ii, p. 50, t. 15, fig. 10, 1844.

— PETAGNÆ. (*Scacchi*) sec. *Phil.* En. Moll. Sic., vol. ii, p. 51.

— COSTULATA. *Webb* and *Bertholet.* Nat. Hist. des Iles Canaries, p. 103, pl. 7, B, figs. 23, 25, 1842.

— — *Jeffreys.* An. Nat. Hist., vol. xix, p. 313.

— CYLINDROIDES. *S. Wood.* Catalogue, 1840.

CRENELLA COSTULATA. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 205, pl. 45, fig. 1, 1849.

Spec. Char. Testâ minutâ, oblongâ, subcylindricâ, anticè angustata et ultra apicem productâ, medio lævi; in utroque latere costato-striatâ.

Shell small, oblong, subcylindrical, anterior side somewhat contracted, extending beyond the umbo, middle smooth, with large costated striæ upon both sides.

Longest diameter, $\frac{5}{8}$ths of an inch. *Shortest,* $\frac{2}{8}$ths.

Locality. Cor. Crag, Sutton.

Red Crag, Walton Naze.

Only one specimen in my cabinet has been obtained from the older or Coralline Crag Formation; but in the Red Crag at Walton it does not appear to be at all scarce, at least a couple of dozen have fallen to my lot, and in them a considerable range in variation may be detected.

Our shell appears to agree with the figure and description of *M. costulata,* in the first vol. of Philippi, which that author, in his second volume, has assigned to another species: amongst my specimens also are forms corresponding with what he considers to be specifically distinct, and they are therefore both introduced among the synonyma, as I am unable to separate into two species those which are found in the Crag; if, however, there be in the recent shells characters sufficient to justify a specific distinction, both forms seem to have been present in the seas that deposited the Red Crag, but from what is exhibited in the fossils, they may be fairly included in one species.

There can be no mistake in regarding this as distinct from either *M. discrepans* or *M. marmorata,* from both of which it differs in being more cylindrical, with also a greater curvature in the ventral margin. It is an elegantly-formed shell, the anterior side slightly projects beyond the umbo, somewhat tumid, with a rounded angularity crossing the shell diagonally from the beaks to the posterior part of the ventral margin, the anterior side is rounded, and deeply striated or ridged with about ten or twelve small ribs; the middle is plain, or only marked by lines of growth, while the greater half of the shell on the posterior side is covered with striæ in a radiating manner, these are so conspicuous at the margin as to produce somewhat large and distinct crenulations on the inner edge, most conspicuous a little behind the

ligament, but they extend along the whole line of hinge or dorsal area; the posterior side in some specimens is much rounded, so as to give a cylindrical form to the shell, while in others there is an angular slope on the posterior side, from a little beyond the termination of the hinge line to the ventral margin, which gives a greater width to that part, thereby producing a different form, and which, in consequence, were that a permanent character, might be considered a distinct species, but my specimens are exceedingly variable, so as to present no marked distinction between the two.

5. MODIOLA SERICEA, *Bronn.* Tab. VIII, fig. 3.

MODIOLA SERICEA.		*Bronn.* Ital. Tert. Geb., p. 122, No. 649, 1831.
—	—	*Phil.* En. Moll. Sic., vol. i, p. 71, t. 5, fig. 14, 1836.
	—	*Id.* - - - vol. ii, p. 52, 1844.
—	—	*Nyst.* Add. à la Faune. Conch., p. 444, No. 38, 1842.
—	HYALINA.	*S. Wood.* Catalogue, 1840.
MYTILUS SERICEUS.		*Goldf.* Pet., vol. ii, p. 179, pl. 131, fig. 12, *a—c*, 1841.
—	—	*Nyst.* Conch. Foss. de Belg., p. 271, pl. 21, fig. 2, *b—e*, 1844.
—	—	*E. Sism.* Synop. Meth. An. Invert., p. 15, 1847.
		Bronn. Ergeb. meiner. naturh.-ökon Reise, vol. ii, p. 620, sec. *Nyst.*

Spec. Char. Testâ tenuissime, subhyalinâ, elliptico-ovatâ, tumidâ; valdè inæquilaterâ; striatâ, striolis exilibus confertis; umbonibus prominentibus recurvis; margine ventrali subrecto, tenuissime crenulato.

Shell thin delicate, subhyaline, of an elliptical or ovate form, tumid; very inequilateral; covered externally with numerous close-set, extremely fine, radiating striæ; umbo projecting beyond the anterior side; ventral margin nearly straight and finely crenulated.

Locality. Cor. Crag, Ramsholt and Sutton.

It is very difficult to obtain specimens of this species in perfection, on account of its extreme thinness, although they appeared at Ramsholt to be by no means rare, but they are generally more or less broken or distorted.

This beautiful species is of an ovate or elliptical form, very tumid, excessively thin and semitransparent; it is covered over its whole surface with extremely fine radiating striæ, crossed occasionally by irregular lines of growth, but not regularly decussated; the ligamental area extends about half the distance of the dorsal portion, its termination forming a very obtuse angle; the umbo is terminal and somewhat prominent, curved, and slightly projecting beyond the anterior margin.

This appears at present to be known only as a fossil. My largest specimen measures an inch and a quarter in its longest diameter.

6. MODIOLA MARMORATA, *Forbes.* Tab. VIII, fig. 7.

MYTILUS	DISCORS.		*Da Costa.* Brit. Conch., p. 221, t. 17, fig. 1, 1778.
—	—		*Walker* and *Boys.* Test. Min. Rar., pl. 3, fig. 79, 1789.
—	—		*Poli.* Test. Utr. Sic., vol. ii, p. 211, pl. 32, figs. 15, 16, 1795.
—	—		*Donov.* Brit. Shells, vol. i, pl. 25, fig. 1, 1799.
—	—		*Mat.* and *Rock.* Linn. Trans., vol. viii, p. 111, pl. 3, fig. 8, 1807.
—	—		*Mawe.* Conch., pl. 13, fig. 5, 1823.
—	—		*W. Wood.* Ind. Test., pl. 12, fig. 39, 1825.
MODIOLA	—		*Turt.* Brit. Biv., p. 201, pl. 15, fig. 4, 1822.
—	—		*Brown.* Illust. Brit. Conch., pl. 29, fig. 10, 1827.
—	—		*S. Wood.* Catalogue, 1840.
—	—	?	*Gould.* Inv. Massach., p. 15, fig. 84, 1841.
—	DISCREPANS.		*Phil.* En. Moll. Sic., vol. i, p. 70, 1836.
—	—		*Id.* - - - vol. ii, p. 50, pl. 15, fig. 11, 1844.
—	—		*Payr.* Cat. Moll. Cors., p. 67, 1826.
—	EUROPÆA.		*D'Orb.* fide *Lovén.*
—	TUMIDA.		*Hanley.* Rec. Shells, vol. i, p. 241, pl. 12, fig. 39.
—	MARMORATA.		*Forbes.* Malac. Monen., p. 44, 1838.
—	—		*Brown.* Illust. Brit. Conch., 2d ed., pl. 27, fig. 10.
—	—		*Alder.* Cat. Moll. North. and Durh., p. 82, 1848.
MODIOLARIA	—		*Lovén.* Ind. Moll. Scand., p. 33, 1846.
CRENELLA	—		*Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 198, pl. 45, fig. 4, 1849.

Spec. Char. Testâ minutâ, ovato-ellipticâ, tumidâ, tenui, fragili; utroque latere striatâ, spatio submediano lævigato vel transversè striato; umbonibus minimis subterminalibus.

Shell small, ovate or elliptical, tumid, thin, and fragile; both sides radiatingly striated, with a smooth or rather transversely striated space between them; umbones small, subterminal.

Longest diameter, $\frac{3}{8}$ths of an inch.

Locality. Cor. Crag, Sutton.

Red Crag, Walton Naze.

Recent, Mediterranean, Britain, Scandinavia, and North America?

Small specimens and fragments of this species are abundant in the Coralline Crag at Sutton, and it appears to have been one of the commoner shells of that Period. There is no doubt, of this shell being identical with the recent British species, now determined not to be the *discors* of Linnæus, a name given to a larger shell (*Mytulus impactus*, *Herm.*) by the Swedish naturalist.

Our shell in the fossil state has become opaque, but it has retained its nacreous appearance; it is of an elliptical form, the anterior side being rather broader than the posterior, which is slightly narrowed off from the dorsal slope; the umbones are small, slightly inflected, with the anterior side projecting a little beyond them, the shell is somewhat regularly tumid, with a very slight flattening on the dorsal portion: the

tripartite division of the exterior is of unequal dimensions, the posterior striæ covering nearly but not quite half the surface, while the anterior occupies rather a less space than the centre or naked compartment; the striæ or rays are large and rounded, numbering about a dozen or fourteen on the anterior side, with about double that number on the posterior portion: the whole shell is covered with transverse striæ or regular lines of increase, which prettily ornament the spaces between the ridges, and the edge of the shell is deeply crenulated on the anterior and posterior sides, or those portions which are covered with the radiating ridges; the tripartite division of the shell, is visible in the interior, and the number of the external striæ may be counted there. The edge of the ventral margin has a slight convexity, contracting a little towards the striated parts.

The differences between this species and the following are so evident, there can be no mistake, that shell being more compressed or less tumid, with the posterior side broader in proportion. The shell to which this approaches nearest, is *M. semi-nuda*, *Desh.*, 'Desc. des Coq. Foss. des Env. de Par.,' vol. i, p. 264, pl. 30, figs. 20—22, a fossil belonging to the Formations of the Older Tertiaries. I have not been able to obtain a specimen from the Paris Basin; but what I presume to be the same species in the Cabinet of Mr. Edwards, from the English Deposits, presents differences that may be regarded as specific. Mr. Edwards's shell is more regularly ovate, and is even thinner than our species, with fewer radiations on the anterior side, not having more than seven or eight, and these are broader, it is also, more regularly tumid than our own shell, which has somewhat of an obtuse angle on the posterior portion.

The shell figured and described by Dr. Gould, under the name of *M. discors*, seems to present but trifling differences with the British shell, judging from description alone; but it is considered to be distinct by British Conchologists, as well as by Dr. Lovén.

7. Modiola discors, *Linnæus*. Tab. VIII, fig. 5.

Mytilus discors.	*Linn.*	Syst. Nat., ed. 12, p. 1159, No. 261, 1767.
— discrepans.	*Mont.*	Test. Brit., p. 169, 1803.
Modiola discrepans.	*Turt.*	Brit. Biv., p. 202, 1822.
— —	*Desh.*	2d ed. Lam., t. vii, p. 23, 1835.
— —	*Forbes.*	Malac. Monens., p. 44, 1838.
— —	*Möller.*	Ind. Moll. Groenl., p. 19, 1842.
— —	*Alder.*	Cat. Moll. North. and Durh., p. 81, 1848.
Modiolaria discors.	*Lovén.*	Ind Moll. Scand., p. 33, 1846.
Crenella discors.	*Forb.* and *Hanl.*	Hist. Brit. Moll., vol. ii, p. 195, pl. 45, figs. 5, 6, and pl. 48, fig. 5, 1849.

Spec. Char. Testâ ovato-ellipticâ, subcompressâ, valdè inæquilaterâ, tenui; anticè et posticè striatâ, spatio mediano lævigato; latere postico latiore.

Shell ovato-elliptical, somewhat compressed, very inequilateral, thin; striated at

both extremities, middle space smooth, posterior side of the shell broader than the anterior.

Longest Diameter, $\frac{1}{2}$ an inch.

Locality. Mam. Crag, Chillesford. Recent, Britain and Seas of Norway.

A specimen strongly resembling this species is in my Cabinet, obtained in the native bed of the Mammaliferous or Newer Crag Period, at Chillesford. The shells in that deposit are excessively fragile, and are preserved with difficulty. This specimen appears also to have lost a portion of its outer surface: there is, however, upon the exterior, traces of what the sculpture has been, and as far as it can be observed, it seems to correspond with that upon the recent shell, it is, therefore, appropriated to the above species without much doubt; and, as its congeners in the same deposit are such as we know to be its associates at the present day, it might fairly be expected in that Formation. In the recent state it is considered more of a Boreal form, with but a limited range to the Southward. The earliest appearance of this species is in the upper portion of the Crag, where it seems to have been by no means abundant. I have found it in the recent state upon the shore of the Coast of Suffolk, in pools of water, left by the retreat of the tide.

8. MODIOLA RHOMBEA, *Berkeley*. Tab. VIII, fig. 8.

MODIOLA PRIDEAUXIANA.	*Leach*. Zool. Miscel., vol. ii, p. 35, 1815.
— —	*Brown*. Brit. Conch. Illust., pl. 29, fig. 9, 1827.
— RHOMBEA.	*Berkeley*. Zool. Journ., vol. iii, p. 229, Suppl. pl. 18, fig. 1, 1827.
— —	*Thorpe*. Brit. Mar. Conch., p. 107, 1844.
— —	*Brown*. Brit. Conch. Illust., 2d ed., p. 78, pl. 39, fig. 17.
— ASPERULA.	*S. Wood*. Catalogue, 1840.
CRENELLA RHOMBEA.	*Forb.* and *Hanl.* Hist. Brit. Shells., vol. ii, p. 208, pl. 45, fig. 3, 1849.

Spec. Char. Testâ minutâ ovato-oblongâ vel trapeziformi, tumidâ, inflatâ, crassâ; costulato-striatâ, sulcis vel striis divaricatis; anticè abbreviatâ, rotundatâ, posticè majore, angulatâ; margine ventrali sinuato; natibus prominulis incurvis.

Shell small ovato-oblong or trapeziform, tumid, or inflated, covered all over with large or costulated bifurcating striæ; anterior side, short and rounded, posterior larger, and angulated; ventral margin sinuated, with incurved and slightly projecting umbones.

Greatest Diameter, $\frac{1}{6}$th of an inch.

Locality. Cor. Crag, Sutton. Recent, British Seas, and Coast of Sutherland.

This is considered by the authors of the 'Hist. of Brit. Mollusca,' as an extremely rare shell in the recent state, and somewhat of a modern addition to the *Marine Fauna*, of the British Isles. Although noticed by Dr. Leach as early as the year 1815, it has since rarely been met with and seldom seen in the Cabinets of collectors. It is not so in the fossil, but is very abundant in the rich depôt of small shells at Sutton.

The recent shell is said to be as much as a quarter of an inch in diameter: the largest of my fossil specimens, does not exceed the sixth of an inch in its extreme dimensions, measured diagonally from the umbo to the posterior part of its ventral margin. There is, nevertheless, but little doubt of their identity, as the only difference is that of size, the Crag specimens corresponding in all other characters with the recent shell. It is very much inflated: the two valves when united, having a greater diameter than is given when measuring from the dorsal to the ventral margin; the umbo is terminal, projecting a little beyond the anterior of the shell, and is slightly curved; it is somewhat rhomboidal in its contour, with a little obliquity towards the posterior side, and a slight indentation in the ventral margin, the posterior side forming an obtuse angle with the edge of the shell that contains the ligament; the exterior is ornamented with large prominent striæ, or rather small ribs which bifurcate, and are more numerous in the old than in the young shell, they are crossed and made somewhat rough by prominent and distinct lines of growth, at rather irregular distances, sometimes giving a decussated appearance to the shell; the prominent costulated striæ project beyond the margin, and give a deeply crenulated edge all round; the ribs are sometimes visible in the interior, although the specimens are often so thick as not to allow them to be seen on the inside; and in that case, the impressions formed by the muscles are deeply indented, that by the anterior adductor is comparatively very large. The ligament seems to have been a strong one, as a deep linear depression is formed within the dorsal margin. This shell has been dredged in the living state, in 20 fathoms water, off Penzance.

Pectunculus,* *Lamarck*, 1791.

Pectunculus Polyleptoginglymus (sp.) *List.*, 1687.
Mactra? *Browne*, 1756.
Arca (spec.). *Linn.*, 1767.
Glycimeris. *Da Costa*, 1778. *Humph.*, 1797.
Axinæa Axinæoderma. *Poli*, 1795.
Tuceta. *Bolton*, 1798, sec. *Herrm.*

Generic Character. Equivalve, orbicular, convex or lenticular, subequilateral, closed, thick and strong; externally smooth or ornamented with radiating striæ or costæ. Hinge teeth small, numerous, forming an arched or curved line, central denticles becoming obsolete in old shells. Ligament external, attached to a grooved area in each valve, with distant beaks. Impressions of the adductors two, lateral and strongly marked, that by the mantle entire, or without a sinus.

* Etym. The diminutive of *Pecten*.

Animal orbicular, or of the form of the shell and capable of being entirely covered when the valves are closed, mantle with its margins simple and disconnected, somewhat enlarged in the anal regions; a large semilunar shaped foot with undulating edges, permitting an expansion into a subdiscoidal form. No byssus.

This is purely a marine genus, inhabiting waters of various depths, with an extensive geographical range; though it does not as yet appear to have been found in any of the very cold regions of the globe. In a recent state the shells are generally covered with a velvety epidermis, except about the umbones, where it is often worn off.

The species are not numerous, either recent or in a fossil state, but appear to have long been inhabitants of this planet, two or three are described by Colonel Portlock, from the Silurian Rocks of Tyrone, and others have been found in the Oolites and Green sand, but the shells are not of any magnitude, until the Tertiary Periods, in which as individuals they are largely developed, both in Europe and in the Upper Tertiaries of America.

This is a well-marked genus, and not likely to be confounded with any other, except *Limopsis*, from which, however, it may be distinguished by the ligamental area being simple, or only marked with angular or diverging lines, while in that shell the cartilage is more distinctly separated from the ligament, and placed in a triangular fossette immediately beneath the beaks.

The ligament in this genus occupies the entire space between the umbo and the hinge margin, not equally spread over the surface, but placed in diagonal, or rather in lines diverging from the beak towards the lateral margins, by which a deep impress or furrow is formed and left upon that part of the shell.

1. PECTUNCULUS GLYCIMERIS, *Linnæus*. Tab. IX, fig. 1, *a*—*h*.

Bonanni. Recr. Ment. et Ocul., fig. 61, 1684.

CHAMA GLYCIMERIS BELLONII. *List*. Hist. Conch., lib. iii, pars 11, fig. 82, and fig. 80? 1687.

PECTUNCULUS FOSSILIS. *Dale*. Hist. and Antiq. of Harw., p. 291, t. xi, fig. 3, 1730.

ARCA GLYCIMERIS. *Linn*. Syst. Nat., ed. 12, p. 1143, No. 181, 1767.

— — *Poli*. Test. Sicil., vol. ii, p. 144, t. 26, fig. 1; t. 25, fig. 19, 1795.

— — *Don*. Brit. Shells, vol. ii, pl. 37, fig. 2, 1800.

— — *Mat*. and *Rack*. Linn. Trans., vol. viii, p. 94, t. 3, fig. 3, 1807.

— — *W. Wood*. Ind. Test., p. 46, pl. 10, fig. 36, 1825.

— — *Mawe*. Lin. Syst. Conch., pl. 13, fig. 7, 1823.

— — *Burrow*. Elem. of Conch., p. 143, pl. 8, fig. 7.

— PILOSA. *Linn*. Syst. Nat., ed. 12, No. 182, p. 1143, 1767.

— — *Poli*. Test. Sicil., vol. ii, p. 138, t. 26, fig. 2—4, 1795.

— — *Broc*. Conch. Foss. Subap., p. 487, 1814.

— — *Mat*. and *Rack*. Linn. Trans., vol. viii, p. 94, t. 3, fig. 4, 1807.

— — *W. Wood*. Ind. Test., p. 46, pl. 10, fig. 37, 1825.

ARCA SCRIPTA. *Born*. Mus. Cœs. Vin., p. 93, t. vi, fig. 1, 1780.

— UNDATA. *Chem*. Conch. Cab., vol. vii, p. 224, pl. 57, fig. 560, 1784.

ARCA UNDATA. *Broc.* Conch. Foss. Subap., p. 489, 1814.
— POLYODONTA. *Broc.* - - - p. 490, 1814.
— FLAMMULATA. *Renieri.* fide *Philippi.*
GLYCIMERIS ORBICULARIS. *Da Costa.* Brit. Conch., p. 168, p. 11, fig. 2, 1778.
PECTUNCULUS GLYCIMERIS. *Turt.* Brit. Biv., p. 171, t. 12, fig. 1, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 25, figs. 8, 9, 1827.
— — *Crouch.* Int. Lam. Conch., pl. 8, fig. 11, 1827.
— — *Reeve.* Conch. Icon. Pectunc., pl. 3, fig. 12.
— — *Dujard.* Mem. Geol. Soc. de Fr., t. ii, par. 11, p. 267, No. 1, 1837.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 245, pl. 46, figs. 4—7, 1849.
— PILOSUS. *Turt.* Brit. Biv., p. 172, t. 12, fig. 2, 1822.
— — *Schum.* Essai d'un Nouv. Syst. des Vers. Test., p. 172, pl. 19, fig. 3, 1817.
— — *Brown.* Illust. Conch. G. B., pl. 25, figs. 10, 11, 1827.
— — *Blainv.* Man. Malac., pl. 65 bis, fig. 3, 1825.
— — *Reeve.* Conch. Icon. Pectunc., pl. 3, fig. 13.
— — *G. Sowerby, Jr.* Conch. Man., fig. 134, 1843,
— — *G. Sow.* Genera, No. 5, fig. 1.
— — *S. Wood.* Mag. Nat. Hist., 1840, p. 13, fig. 7.
— — *Nyst.* Coq. Foss. de Belg., p. 247, pl. 19, figs. 6, 7, 1844.
— UNDATUS. *Turt.* Brit. Biv., p. 173, t. 12, figs. 3, 4, 1822.
— DECUSSATUS. *Id.* - p. 173, t. 12, fig. 5.
— NUMARIUS. *Turt.* Brit. Biv., p. 174, t. 12, fig. 6, 1822.
— VARIABILIS. *J. Sow.* Min. Conch., t. 471, fig. 1, 1824.
— — *Woodward.* Geol. of Norf., p. 43, 1833.
— — *Id.* Coq. Foss. de Belg., p. 249, pl. 20, fig. 1, *a—b*, 1844.
— — *Phil.* En. Moll. Sic., vol. ii, p. 45, 1844.
— POLYODONTA. *Goldf.* Pet. Germ., vol. ii, p. 161, t. 126, figs. 6 & 7, *a—d.*
— PULVINATUS. *Brongn.* Vincent., p. 77, pl. 6, figs. 15, 16, 1823.
— — ? *Bast.* Bord. Foss., p. 77, No. 2, 1825.
— — ? *Dubois de Mont.* Conch. Foss. de Wolhyn., p. 64, pl. 7, figs. 7, 8, 1831.
— SUBOBLIQUUS. *S. Wood.* Mag. Nat. Hist., 1840, p. 233, pl. 13, fig. 6.
— TRANSVERSUS.? *Dubois de Mont.* Coq. Foss. de Wolhyn., p. 65, pl. 7. fig. 9.
— NUMIFORMIS. ? *Id.* - - - - p. 66, pl. 7, fig. 6.
— LATIAREA. *Michelotti.* fide *Sismonda.*
— PUSILLUS? *Dujard.* Mem. Geol. Soc. de Fr., t. 2, pt. 2, p. 276, 1837. Ency. Method., p. 310, figs. 2 & 3.
ARCA. *Smith.* Strat. Identif. Craig, t. 2, fig. 7, 1816.

Spec. Char. Testâ variabile, suborbiculatâ, subovatâ, transversâ, sæpè obliquâ subæquilaterâ, compressâ vel tumidâ, costato-striatâ; margine crenulato.

Shell variable, suborbicular, elongate or transverse, often oblique, subequilateral, compressed or tumid; striated; margin crenulated.

Diameter, $3\frac{1}{4}$ inches.

Locality. Cor. Crag, Passim.
Red Crag, Passim.—Var. β, *subobliquus*, Walton Naze.
Mam. Crag, Thorpe, Bridlington (*Leckenby*).
Recent, Britain, and Mediterranean.

This is one of the most common and abundant shells in the Coralline as well as in the Red Crag Deposits. In the Coralline, the valves, as might be expected, are often found united.

The determination of this species is exceedingly difficult, and the form which was figured in the 'Mag. Nat. Hist.' (var. β), presented characters it was then thought sufficient for the establishment of a new one, but the recent species has been found to exhibit the same obliquity; this variety I have never seen from the Older or Coralline Crag, but it is one of the commonest shells at Walton on the Naze, where the two valves are frequently found united; it is generally thinner, and some specimens are very oblique, and this may be considered the limit of range in variation in one direction; var. α in the other; between these forms every imaginable gradation may be pointed out in almost any collection possessing a good series of this abundant Crag shell, so well named by Mr. J. Sowerby (*variabilis*). There is scarcely a possibility of giving a correct diagnosis of this species, but what some deviation may be pointed out, and in consequence of which the varieties have been made into several species, as may be seen in the above list of synonyma, all, it is presumed, belong to this species. Specimens are somtimes longer than they are broad, and *vice versâ*, some are lenticular, with but little tumidity, others are much inflated. The exterior is generally more or less ornamented with raised, radiating, and distant striæ, variable in number, producing a like variation in the number of crenulations upon the interior margin of the valves; in some they are as many as sixty, while in others they do not exceed thirty-five; neither is the number of teeth or denticles of the hinge a more permanent character, for in old specimens the ligamental area is pushed so far forward as to have obliterated all the central teeth, and they become almost toothless, not more than three or four remaining; while in some specimens as many as eighteen may be counted on each side of the umbo, they are prominent, somewhat angular, flattened on the top, and when perfect, generally crenulated on the edges; between each is a deep depression for the reception of those in the opposing valve, and in very young shells the hinge is almost entirely destitute of denticles (fig. 1, *e*). Every size may be readily obtained, and my cabinet contains a series varying from specimens less than the eighth of an inch to those in which the diameter is nearly three and a half inches, dimensions exceeding those generally obtained in our seas; and this magnitude may be seen in shells from the Coralline as well as the Red Crag Deposits, while the species seems to have been rare in the Norwich beds.

Some American Tertiary shells figured by Conrad under two or three different names, approach so closely to those of the Crag as to render the distinction doubtful, as far as regards representation alone.

In some of my specimens from the Coralline Crag, where the two valves are in their natural state a very perceptible difference may be observed, not only in one valve having a greater tumidity than the other, but the inflated valve has also a larger diameter. Perhaps the ovarium in these specimens occupied a position not quite central, thereby giving a little inequality to the valves.

There are nodules of indurated sandstone in my cabinet, which contain casts of what appear to be the interior of this species, and also those of *Isocardia cor.* where the shell has been absorbed or abstracted; these nodules were obtained on the beaches of Walton Naze and Felixstow, and were in all probability washed out of the Red Crag.

Limopsis, *Sassi.* 1827.

Arca (spec). *Brocchi.*
Trigonocœlius. *Nyst et Galeotti,* 1835.
Limnopsis. *Gray,* 1840.
Pectunculina. *D'Orb,* 1844.
Crenella. *Herrmansen,* 1846.

Generic Character. Shell orbicular or obliquely ovate, convex or lenticular, equivalved, subequilateral, and closed. Hinge composed of numerous teeth, arranged in a more or less curvilinear direction, projecting and interlocking. Umbones distant. Cardinal area large and external, divided by a triangular fossette immediately beneath the umbo. Impression of the mantle entire, or without a sinus; those by the adductors subovate, and deeply impressed.

ANIMAL UNKNOWN.

The characters by which this Genus is distinguished from the preceding one is the triangular fossette in the centre of the ligamental area, separating the cartilage from the ligament; first proposed as of generic importance by Sassi, in 1827, according to Bronn, and his name has priority over that by MM. Nyst and Galeotti, which bears a date several years later. This peculiar character of the hinge was observed and pointed out by Brocchi in 1814, but of course considered by him as of specific value only, his shell being placed in the genus *Arca.* The separation of the ligament into two distinct portions, although both of these are placed exterior to the hinge line, appears equivalent to the otherwise more general distinction of this ligature, one portion being within the hinge line, while the other is on the outside. Eighteen species are enumerated by M. Nyst, one of which is recent from the Red Sea.

1. LIMOPSIS AURITA, *Brocchi*. Tab. IX, fig. 2.

ARCA AURITA. *Broc.* Conch. Foss. Subap., p. 485, t. xi, fig. 9, *a—b*, 1814.
PECTUNCULUS AURITUS. *Defr.* Dict. Scien., t. xxxix, p. 224.
— — *Goldf.* Pet. Germ., v. ii, p. 163, t. 126, fig. 14, *a—b*.
— — *Phil.* En. Moll. Sic., vol. i, p. 63; vol. ii. p. 45.
— — *Risso.* Hist. Nat. des Princip. Prod. de l'Europ., t. iv, p. 318, 1826,
— SUBLÆVIGATUS. *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. Brit. Foss., p. 97, 1843.
LIMOPSIS AURITA. *Sassi.* Giorn. Ligust. (ex. *Bronn*), 1827.
— — *Bronn.* Leth. Geo., vol. ii, p. 935, t. 39, fig. 7, *a—b*, 1838.
— — *Sismonda.* Syn. Meth. Ped. Foss., p. 15, 1847.
TRIGONOCŒLIA SUBLÆVIGATA. *Nyst.* et *West.* Nouv. Rech. Coq. Foss. d'Anv., p. 12, pl. 2, fig. 15, 1839.
— — *Nyst.* Coq. Foss. de Belg., p. 244, pl. 26, fig. 2, *a—b*, 1844.

Spec. Char. Testâ obliquâ, rotundato-ovatâ, inæquilaterâ, sublævigatâ, auriculatâ; exilissimè striatâ, et tenuissimè decussatâ; cardine arcuata, dentibus 10—18*; margine integerrimo, acuto.*

Shell oblique, rounded ovate, inequilateral, nearly smooth, and glossy, with small auricles; externally ornamented with very fine striæ, crossed by distinct lines of growth; hinge line curved, with about 10 to 18 teeth; margin sharp and smooth.

Longest diameter, $\frac{1}{2}$ an inch.

Locality, Cor. Crag, Gedgrave.

This species has recently been found in abundance in one locality of the Coralline Crag, but it appears restricted to that spot, it may possibly have lived on into the Red Crag period, as my cabinet contains one specimen from that Formation, which however is much waterworn.

It is subject to a good deal of variation in its outward form, but is always more or less obliquely oval, generally becoming especially so in the older specimens, while in some young shells the valves are nearly equilateral. The hinge is composed of a row of denticles, varying from ten to sixteen, those on the shorter or rounded side being the greater number, amounting to about nine, the outermost are angular and somewhat distant, while the inner ones are close set and vertical; on the other side they are fewer, not exceeding seven, sometimes not more than four, these are distant, much inclined, and nearly parallel to the hinge line, furthermore they are often rough and crenulated upon their edges. The exterior of the shell is smooth and even glossy when perfect, with faint but distinct radiating striæ and visible lines of growth, and the hinge line projects a little beyond the otherwise oval contour of the shell, giving it the appearance of auricles, hence its name; the inner margin is flattened, smooth, and perfectly free from crenulations, and the impressions by the adductors deeply seated; that on the shorter side small and ovate placed near the hinge, the other is larger and more distant; the fossette for the cartilage diverges from the umbo at an angle of about 90°.

In the young state the specimens have fewer teeth, and the shell, as before stated, is less oblique, resembling the young of *Pectunculus*, from which it may be distinguished by its smooth and acute margin at all ages; while in the very small or young specimens of *P. glycimeris* the crenulated edge may be always seen. Some specimens are more tumid than others, but none are much inflated, and the exterior is smooth and perfect, except where it has been eroded, when the rays are more displayed, giving it there a granulated or decussated appearance, like *Arca aurita* of Brocchi, from which it appears to differ only in size.

The remains of red-coloured bands may be seen upon some specimens as if the shell had been so ornamented when in a living state, or perhaps it was of one uniform colour, a part of which only has been abstracted.

Trigonocœlia Goldfussii, Nyst, from Kleyn Spauwen, much resembles our shell, but is probably specifically distinct; it has its margin obsoletely crenulated, and the denticles are more numerous, with a slight difference in their arrangement.

LIMOPSIS PYGMÆA, *Philippi*. Tab. IX, fig. 3.

PECTUNCULUS PYGMÆUS. *Phil.* En. Moll. Sic. vol. i, p. 63, t. 5, fig. 5, 1836; not *Lamarck*.
— — *Id.* - - - vol. ii, p. 45, 1844.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 234, pl. 13, fig. 5, 1840.
— — *Id.* Catalogue, 1840.
— — *Goldf.* Pet. Germ. vol. ii, p. 162, t. 126, fig. 11, *a—c*.
— — *Morris.* Cat. Brit. Foss., p. 97, 1843.
TRIGONOCŒLIA DECUSSATA. *Nyst et West.* Nouv. Rech. Coq. Foss. d'Anv., p. 12, No. 29, pl. 2, fig. 16, 1839.
— — *Nyst.* Coq. Foss. de Belg., p. 245, pl. 18, fig. 7, *a—d*, 1844.
LIMOPSIS PYGMÆA. *Sism.* Syn. Meth. Ped. Foss., p. 15, 1847.

Spec. Char. Testâ minutâ, obliquâ, inæquilaterâ, subtrapeziformi, gibbosâ, crassâ, auriculatâ; transversim sulcatâ, striis radiantibus tenuissimis, subobsoletis; margine crenulato, dentibus circa decem.

Shell small, oblique, inequilateral, subtrapeziform, gibbous, thick, and strong; hinge line straight, furnished with about ten teeth; externally covered with fine and nearly obsolete radiating striæ, crossed by more distant and distinct lines of increase; margin crenulated.

Longest diameter, $\frac{1}{4}$ of an inch.

Locality. Cor. Crag, Sutton.

This species, as far as I know, is restricted to a single locality, where it is one of the most abundant shells, and the two valves are often found united. I have little doubt it is the same as Philippi's Sicilian fossil, judging from the figure he has given; the Belgian shell appears rather larger or badly represented, but from description it is probably the same. Our shell may be further described as being very tumid, the depth of the valves united equals the width of the hinge line; its dental formula

consists of about ten teeth, six upon the anterior or rounded side, these are placed nearly vertical, or forming an obtuse angle, and very prominent in the centre, the four teeth on the posterior or produced side are much inclined and nearly parallel with the hinge line, they are also obtusely angular, interlocking between those of the opposite valve, and by their prominence keeping the two portions united; hinge margin with a row of crenulations deeper, larger, and more visible within upon the posterior side: when the shell is perfect the exterior is finely decussated, the radiating striæ not being more prominent than the lines of growth, but when the exterior coating is removed, which is generally the case more or less, the surface is strongly rayed or costated. In the young state the shell is less tumid than when full grown and less oblique. The muscular impressions are unequal in size and suborbicular, the anterior one or that upon the shorter side is situated close up to the hinge line; the one on the posterior or opposite side is larger and much nearer to the ventral margin.

This shell in form and magnitude bears a resemblance to *Pectunculus nanus*, Deshayes, an Eocene fossil from the Paris Basin, figured and described in his 'Hist. des Coq. Foss. des Env. de Paris, vol. i, p. 226, t. 36, figs. 4, 5, 6; but judging from the figure as well as from the description, there appears a different arrangement of the teeth or denticles, those of the French shell have the greater number upon the larger or produced side, amounting to as many as six, with only three or four upon the other or shorter side, and are less oblique, thus reversing the dental arrangement of the Crag shell; and the French fossil is said to be thin and fragile, while ours is thick and strong. The triangular fossette of the Crag shell is deep, and forms an angle less than 90°, and the margin of the shell is perfectly closed all round.

Nucinella, *S. Wood.*

Nucula (sp.). *Deshayes*, 1829.
Pleurodon. *S. Wood*, 1840.
Nuculina. *D'Orbigny*, 1845, sec. *Gray*.

Gen. Char. Shell equivalve, inequilateral, closed, ovate or subtrigonal; anterior side short, truncate; posterior produced, ovate or subangular; hinge line broad slightly curved, furnished with few teeth: one large lateral tooth on the posterior side. Ligament external.

ANIMAL UNKNOWN.

The diagnosis of this was drawn up from what may be considered as scarcely sufficient materials for the distinction of a group of animals, denominated a Genus, being founded upon but one species; it presents, however, such marked differences in character from any genus hitherto established, that I was unable to find a position for my little shell when it was first described. The outward trigonal

form, as well as possessing a linear series of denticles, seem to point out its place as near to *Nucula* from which it differs essentially, in having an external ligament, and one large lateral tooth upon the anterior side.

The shell is of a nacreous texture within, and was, probably, covered with an epidermis in the recent state. The ligament is placed on the posterior side of the umbo, upon a small projecting portion of the shell, and the animal was without prolonged siphonal tubes, the line impressed by the edge of the mantle being like that of *Nucula*, without any indentation. There are no recent species, that I am acquainted with, possessing such a dental arrangement, and its true position is of course conjectural. The linear teeth and external ligament resemble *Pectunculus*, with a form like that of *Nucula*.

1. NUCINELLA MILIARIS, *Deshayes*. Tab. X, fig. 4, *a—c*.

NUCULA MILIARIS. *Desh.* Coq. Foss. des Env. de Par., tom. i, p. 225, pl. 36, figs. 7-9, 1829.

PLEURODON OVALIS. *S. Wood.* Illust. in Mag. Nat. Hist., 2d Series, vol. iv, p. 231, pl. 13, fig. 1, 1840.

— MILIARIS. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ minimâ, subovatâ, lævigatâ, politâ, tumidâ; posticè subtruncatâ, anticè productiore, rotundato-ovatâ: dentibus 5—6 *magnis, obtusis.*

Shell minute, subovate, smooth, glossy, and tumid; posterior side short, subtruncate, anterior large, roundedly ovate; teeth 5—6, large and obtuse.

Diameter, $\frac{1}{10}$ of an inch.

Locality. Paris Basin, Grignon.

Cor. Crag, Ramsholt, and Sutton.

This pretty little shell is by no means rare at either of the above British localities, and at the former (Ramsholt), the valves are often found united, the large and prominent teeth with which they are furnished having kept them in their natural position.

It is one of the very few of our Crag Molluscs, that dates its existence from the Older Tertiaries, or what is called the Eocene Period; as there is reason to believe the species left in the Paris Basin is the true progenitor of our little shell, while it appears to have died out before the severer conditions of the Red Crag Period had set in: although so small a shell, it would not readily be found, unless abundant, in a deposit so disturbed.

As, however, some differences exist between the Crag Fossil, and what is here considered its specific parent, it may be necessary to give a more detailed description and to point out what, perhaps, might be regarded by some Conchologists as of sufficient importance to keep them distinct.

Our little shell in its outward form, slightly resembles a minute specimen of *Nucula nucleus*, except, that it is more tumid; the anterior side constitutes nearly the whole of the shell, the posterior being cut off by an almost straight line from the

umbo to the ventral margin. The hinge is composed of five or occasionally six teeth in the right valve, with six or sometimes seven in the left, these are arranged in a slightly curved line extending on both sides of the beak, three on each side; those on the posterior or shorter side are placed rather closer together than those on the anterior one, they are prominent, obtuse, and large compared with the size of the shell; those in the centre standing nearly perpendicular to the line of hinge, while the outer ones on both sides have their widest portion in an opposite direction, all placed, of course, so as one set can be interposed between those of the opposite, when the valves are closed. The lateral tooth of the right valve has a deep depression between it and the margin for the reception of a large tooth of the left valve. In a specimen of the French Eocene Fossil in my own cabinet, the teeth do not appear to be quite so obtuse as in the Crag shell, and the umbo is somewhat sharper and more terminal, with a rather more angular outline, the posterior side is apparently more truncated or straight, while the shell is nearly transparent.

A species passing out of one Period, where the animals or the remains of them, are of a nature to indicate conditions differing materially from those of another Period into which it is supposed to have had its existence prolonged, and so far removed as to have almost its entire Fauna formed upon a different type, would in all probability be affected in some degree by the change, so as to produce a slight alteration in its calcareous covering, such as would constitute what is called a variety, and these characters might become permanent under the continuance of those altered conditions; but should we not be permitted so to undermine specific integrity, we may at least be allowed a latitude in variation, that is ordinarily conceded to the examination of existing forms, and the differences between the shells of the two periods, which are here considered as identical, is less than is oftentimes presented to us by individuals of undoubtedly the same species in the Crag deposits; even in those recent species that appear to be admitted by almost general consent, as having originated in the earliest Tertiary Periods, a difference may be detected between the older and the more recent specimens, showing those animals that are apparently possessed of capabilities of endurance beyond their contemporaries, have not been able to maintain in strict integrity the supposed unvarying characters originally impressed upon them; all, however, that is contended for here is, that no greater restriction in regard to the limits of variation ought to be imposed upon the line of specific demarkation, merely from differences in Geological Periods, than is granted to deviations among specimens from the same deposit.

Arca,* *Linnæus*, 1758.

Parallelopipedum. *Klein*, 1753.
Anomalocardia. *Id.* (not *Schum*).
Cibota. *Browne*, 1756.
Pectunculus. *Adanson*, 1757.
Arca. *Linnæus*, 1758.
Amygdalum. *Chemnitz*, 1784.
Daphne and Daphnoderma. *Poli*, 1795.
Trisidos. *Bolten*, 1798.
Cucullœa. *Lam.*, 1801.
Arcites. *Martin*, 1809.
Trisis. *Oken*, 1815.
Cyphoxis. *Rafinesque*, 1819.
Arcacites. *Schlot.*, 1820.
Byssoarca. *Swainson*, 1820.
Navicula. *Blainv.*, 1825.
Rhomboides. *Id.*
Scaphula. *Benson*, 1834, not *Swainson*.
Argina? *Gray*, 1840.
Barbatia. *Id.*
Lunarca? *Id.*
Litharca. *Id.* 1844.
Senilia. *Id.*
Scaphura. *Id.*
Isoarca. *Münster*, 1843.
Andara. *Gray*, 1847.
Scapharca. *Id.*

Generic Character. Shell inequilateral, generally equivalve, more or less quadrate or trapezoidal, sometimes closed; at others, with an opening at the ventral margin, thick and strong; externally striated or costated. Umbones distant. Hinge linear, with numerous close-set interlocking teeth. Ligamental area generally large and broad, with angular grooves. Palleal impression entire.

Animal oblong, edges of mantle disconnected, simple or fringed, without siphonal tubes, a large and bent elongated foot with a groove capable of expanding into a disk-like form, and a gland at its base for the production of a byssus. Byssus compact.

Animals of this genus generally spin a substance for their attachment, but many are found located in rocks or holes of shells. Some species have a considerable opening at the ventral margin, in consequence of which, those more strongly marked with that character were placed in a separate genus, under the name *Bysso-arca;* but in individuals of the same species, this opening is subject to great variation, being large in some, while in others it is nearly obliterated.

M. Nyst has published a synoptical table of this genus, in which he has enumerated 459 species, 162 of these are recent, whilst the others are extended through almost every Period, commencing with the Upper Silurian, and ranging through all the intermediate Formations: although some few of these, are probably, only varieties, such an extensive genus might naturally be expected to have a large geographical range; the recent species are found in all parts of the world, though not equally distributed, nearly one hundred being found in the equinoctial regions; and its vertical range, is also very extensive, some being found under stones at low water mark, while others have been met with attached to rocks as deep as eighty fathoms.

* Etym. So called from its Boat-like form.

1. ARCA TETRAGONA, *Poli*. Tab. X, fig. 1, *a—d*.

ARCA TETRAGONA. *Poli*. Test. Sic., vol. ii, p. 137, pl. 25, figs. 12, 13, 1793.
— — *Turt*. Brit. Biv., p. 166, pl. 13, fig. 1, 1822.
— — *Payr*. Cat. Moll. Cors., p. 61, No. 105, 1826.
— — *Desh*. 2d ed. Lam., t. vi, p. 461, 1835.
— — *Forbes*. Malac. Monen., p. 41, pl. 3, 1838.
— — *Id*. Report on Ægean Invert., p. 181, 1843.
— — *Phil*. En. Moll. Sic., vol. i, p. 57, 1836.
— — *Reeve*. Conch. Icon. Monog. Arca, pl. 15, fig. 100, *a—b*.
— — ? *Menke*. Moll. Nov. Holl. p. 37, No. 208, 1843.
— NOÆ. *Mont*. Test. Brit., p. 139, pl. 4, fig. 3, 1803.
— — *Don*. Brit. Shells, vol. v, pl. 158, figs. 1, 2, 1804.
— — *Brown*. Brit. Conch. Illust., pl. 25, figs. 1-3, 1825.
— — *S. Wood*. An. and Mag. Nat. Hist., vol. iv, New Series, p. 231, pl. 13, figs. 2, & 2*a*, 1840.
— — *Morris*. Cat. of Brit. Foss., p. 78, 1843.
— FUSCA. *Mont*. Test. Brit. Sup., p. 51, 1808 (not *Reeve*).
— — *W. Wood*. Ind. Test., p. 45, pl. 9, fig. 14, 1825.
— — *Flem*. Brit. An., p. 397, 1828.
— — *Thorpe*. Brit. Mar. Conch., p. 101, 1844.
— CARDISSA. *Desh*. 2d ed. Lam., t. vi, p. 463, 1835.
— — *Alder*. Cat. Moll. North. and Durh., p. 79, 1848.
— NAVICULARIS. *Desh*. 2d ed. Lam., t. vi, p. 462, 1835.
— — *Phil*. En. Moll. Sic., vol. ii, p. 42, 1844.
— — *Lovén*. Ind. Moll. Scand., p. 33, 1846.
— BRITANNICA. *Reeve*. Conch. Icon. Monog. Arca, pl. 15, fig. 98.
— — *Nyst*. Tab. Syn. des Arches. Viv. et Foss., p. 14, No. 47, 1847.
— PAPILLOSA. *Smith*. Mem. Wern. Soc., vol. viii, pl. 1, fig. 19, 1838.
BALANUS BELLONII. *List*. Hist. Conch., lib. iii, fig. 207, 1687.
Ency. Meth., pl. 308, fig. 3, *a—b*.

Spec. Char. Testâ oblongâ, valdè inæquilaterâ, costato-striatâ, et transversim decussatâ, anticè rotundatâ, posticè angulatâ; carinâ posticâ eminente, acutâ; apicibus remotis incurvis; margine ventrali hiante.

Shell oblong, very inequilateral, with costated striæ, decussated by distinct lines of growth; anterior side rounded, posterior angulated, with a prominent keel or ridge from the umbo to the posterior ventral margin; umbones distant, incurved; ventral margin gaping.

Largest diameter, 1 inch.

Locality. Cor. Crag, Sutton, Ramsholt, and Sudbourn.
Red Crag, Sutton. Recent, Scandinavia, Britain, and Mediterranean.

Very small specimens are by no means rare in the Coralline Crag; but I have met with very few examples of the adult shell. These small or young specimens are very regular in form, being much elongated transversely, of a somewhat rhomboidal shape, the anterior side slopes a little from the extremity of the hinge line, rounding at the ventral margin, while the posterior side is angular, pointed and projecting; the ventral

margin being nearly straight, or with a very little inflection. A full grown specimen found in the Red Crag (fig. 1, *a*—*b*), is very regular in form, and all its ornamental striæ beautifully preserved: the rays or costulated striæ are close and numerous upon the posterior half of the outer side of the umbonal ridge, while they are larger and more distant upon the anterior half; and within the prominent ridge, that slopes from the umbo to the posterior ventral margin, the rays are large and few, amounting to about four or five, and are placed in pairs; they project beyond the posterior margin, giving it a jagged or indented edge. A long line of teeth or crenulations occupy the edge of the hinge margin, they are numerous and vertical on the anterior or shorter side, fewer or more distant, and strongly inclining on the posterior side. The ligamental area is large and concave removing the umbones far apart; this space is ornamented with deep and angular lines diverging from the umbo, in some they are few and deeply impressed, while in others they are more numerous. One specimen in my Cabinet, from the Coralline Crag at Gedgrave (fig. 1, *c*), precisely resembles the distorted specimens found occasionally upon our own Coast, in holes or crevices of rocks, and in which the regularity of form has been interrupted, and the surface much abraded by frequent movements in a confined position, thus producing so great an alteration in the exterior of the shells as to have induced some authors to consider them distinct. In some of these full grown and distorted specimens, the ventral margin is deeply indented or sinuated. They are said by British Conchologists to be regular in form when free, and only distorted when confined to the crevices of rocks.

I have entered it among my synonyma upon the authority of Menke, who gives it as one of the existing species from the North Western Coast, New Holland. He has enumerated several other European shells from that part of the world.

2. ARCA LACTEA, *Linnæus*. Tab. X, fig. 2, *a*—*b*.

ARCA LACTEA. *Linn.* Syst. Nat., ed. 12, No. 173, p. 1141, 1767.
— — *Da Costa.* Brit. Conch., p. 171, pl. 11, fig. 5.
— — *Chem.* Conch. Cab. t. vii, p. 200, t. 55, fig. 547, 1784.
— — *Don.* Brit. Shells, vol. iv, pl. 135, 1803.
— — *W. Wood.* Ind. Test., p. 45, pl. 9, fig. 24, 1825.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 25, fig. 6, 1827.
— — *Mawe.* Linn. Syst. Conch., pl. 13, fig. 4, 1823.
— — *Phil.* En. Moll. Sic., vol. i, p. 57; vol. ii, p. 42.
— — *Forbes.* Rept. on Ægean Invert., p. 181, 1843.
— — *Reeve.* Conch. Icon. Arca, pl. 17, fig. 116.
— — *Dujard.* Mem. Geol. Soc. de France, t. ii, pt. 2, p. 266, 1837.
— — *Hanley.* Recent Shells, vol. i, p. 154, pl. 9, fig. 24.
— MODIOLUS. *Poli.* Test. Sic., vol. ii, p. 137, pl. 25, figs. 20, 21, 1795.
— — *Turt.* ed. Linn., vol. iv, p. 251, 1806.
— PERFORANS. *Turt.* Conch. Dict., p. 9, 1816.
— — *Id.* Brit. Biv., p. 169, t. 13, figs. 2, 3, 1822.
— GAIMARDII. *Payr.* Cat. Moll. Cors., p. 61, pl. 1, figs. 36—39, 1826.

ARCA GAIMARDII. *Desh.* Exp. Sci. Algiers Moll., pl. 124, figs. 8—11.
— QUOYII. *Payr.* Cat. Moll. Cors., p. 62, pl. 1, figs. 40—43, 1826.
— — *Desh.* Append. to Lyell's Princ., 1st ed., vol. iii, p. 10, 1833.
— LACTANEA. *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 232, pl. 13, fig. 3, 1840.
— — *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. Brit. Foss., p. 78, 1843.
— NODULOSA? *Broc.* Conch. Foss. Subap., p. 478, t. ii, fig. 6, *a—c*, 1814.
— — ? *Dubois.* Wolhyn. Podol., p. 64, pl. 7, figs. 21, 22, 1831.
— STRIATA. *Reeve.* Conch. Icon. Arca, pl. 17, fig. 121.
List. Hist. Conch., lib. iii, fig. 69, 1685.
Dale. Hist. and Antiq. of Harwich, p. 291, 1730.
Adanson. Voy. au Senegal, p. 250, pl. 18, fig. 8, 1757.
not ARCA LACTEA, *Brander.* Foss. Hant., pl. 8, fig. 106.

Spec. Char. Testâ ovato-oblongâ, interdum subquadratâ, anticè rotundatâ, posticè obliquè truncatâ; decussato-striatâ; striis radiantibus eminentioribus; area cardinali mediocre profunda; margine ventrali subrectâ.

Shell ovato-oblong, sometimes nearly square, anterior side rounded; posterior obliquely truncated; covered with striæ, crossed by transverse lines of growth; radiating striæ the most prominent; cardinal area not large, with a rounded or obtuse ridge from the umbo backwards; ventral margin nearly straight.

Longest diameter, $\frac{3}{4}$ of an inch; *height*, $\frac{1}{2}$ an inch.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton, Walton Naze. Recent, Britain and Mediterranean.

In the sandy portion of the Coralline Crag at Sutton, a locality that has yielded so many of the smaller and more fragile species of Mollusca, numerous small or young individuals of this species may be obtained. My largest specimen was found in the Red Crag at Walton Naze, and measures an inch in its transverse or largest diameter but it is an old and somewhat mutilated individual.

When my Catalogue was compiled this was considered to be a distinct species, in consequence of a difference in the size of the ligamental area, as in the Crag shell it is smaller than in the generality of recent specimens, the resemblance was, however, so great in all other respects, that the name of *lactanea* was given from its near relationship. I have since seen specimens of the recent shell in which this distinction is lost, and have therefore now united it with the long-known recent species. My specimens from the Crag are very regular in form, and I have not met with any fossils resembling the distorted varieties which have been erected into species by Payraudeau under the names of *A. Quoyii* and *A. Gaimardii*, the greatest variation being slight differences in proportional dimensions, some occasionally being rather more transverse than others.

Arca nodulosa, Müller, given as an inhabitant of the Seas of Norway, by Dr. Lovén, corresponding probably with the Calabrian fossil *A. aspera*, Phil., appears to differ from our shell in being larger and broader on the posterior half, with a more deeply

and regularly decussated exterior, but with a small and narrow ligamental area. *Arca nodulosa*, Brocchi, seems to belong to our present species, as does also, in all probability, the one figured and described under that name by Dubois, judging from his short description and small figure.

ARCA PECTUNCULOIDES, *Scacchi*. Tab. X, fig. 3, *a—b*.

ARCA	PECTUNCULOIDES.		*Scac.* Ann. Civ. delle Due Sicil., vol. vi, p. 82, 1834, fide *Nyst.*
—	—		*Scacchi.* Notizia, p. 25, t. 1, fig. 12, sec. *Phil.*
—	—		*Phil.* En. Moll. Sic., vol. ii, p. 44, t. 15, fig. 3, 1844.
—	—		*Jeff.* Ann. Nat. Hist., vol. xix, p. 313.
—	—		*Lovén.* Ind. Moll. Scand., p. 34, 1846.
—	—	?	*Mich.* Prec. Faun. Mioc., t. 3, fig. 14, 1847.
—	—		*Sismonda.* Syn. Meth. Pedm. Foss., p. 16, 1847.
—	—		*Nyst.* Tab. Synop. des Arches Viv. et Foss., p. 54, No. 300, 1847.
—	RARIDENTATA.		*S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 232, pl. 13, fig. 4, 1840.
—	—		*Thompson.* Ann. Nat. Hist., vol. xviii, p. 385.
—	—		*S. Wood.* Catalogue, 1840.
—	—		*Morris.* Cat. Brit. Foss., p. 78, 1843.
—	—		*Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 241, pl. 45, fig. 8, 1849.
—	PUSILLA.		*Nyst.* Coq. Foss. de Belg., p. 261, pl. 20, fig. 6, 1844.
CUCULLŒA	PUSILLA.		*Nyst.* Rect. Coq. Foss. Prov. d'Anv., p. 14, pl. 3, fig. 55, 1835.

Spec. Char. Testâ parvâ, inæquilaterâ, ovato-rhomboideâ, gibbâ; striis exiguis, decussatis; areâ ligamenti parvâ, apicibus reflexis; cardine recto, utrinque tridentato; margine ventrali subsinuato.

Shell small, inequilateral, ovato-rhomboidal, gibbous; ornamented with fine decussating striæ; ligamental area small, umbones inflected; hinge line straight, furnished with three teeth on each side; ventral margin subsinuated.

Largest diameter, $\frac{1}{6}$th of an inch.

Locality. Cor. Crag, Sutton. Recent, Britain, Mediterranean, and Ægean Seas.

This elegant little shell is another species, but rarely found in the British Seas, and which may perhaps be one of those we might consider to be in a specific decline, or the dying out of what was once largely developed in these latitudes. In the Coralline Crag at Sutton this is one of the most abundant fossils, and I have obtained the separated valves by hundreds.

It is stated by the authors of the 'Hist. of Brit. Moll.' to be slightly inequivalved. In the fossil state I have never been able to obtain a specimen with the valves united. There does not appear to be any doubt of its identity with the living British species, and a single valve obtained from a considerable depth in the Ægean Sea, obligingly given to me by Professor E. Forbes, corresponds in all respects with the Crag shell.

Where the specimens are so abundant, differences of form may naturally be expected, some may be selected that are more elongated and less tumid than others,

and my two most extreme variations are here represented: all give indications of an opening for a byssus by an indentation or sinuosity on the anterior side of the ventral margin; this character is imperfectly represented in the Mediterranean fossil by Philippi, nor is it well shown in that by Nyst, although the probabilities are they all belong to the same species: both of these authors speak of their shell as being by no means abundant. When perfect, it is ornamented with distinct radiating striæ, the largest and most prominent at the two extremities; they are crossed by lines of growth somewhat irregular, and the surface is imperfectly cancellated. Upon the hinge line, on the anterior side, are three or four rather large and prominent teeth, which slope at an angle of about 45°, while those on the posterior, amounting to the same number and equally prominent, are nearly parallel to the hinge margin; in some small or young specimens, these teeth or prominences do not amount to more than two on each side, and all so arranged that when the valves are united, the one set interlock with those of the opposite valve. The place for the ligament is very small, and in perfect specimens there may be seen an entire row of crenulations just within the ventral margin of the shell; and a prominent ridge slopes down the interior from beneath the umbo, probably formed by the inner edge of the adductor muscle on the anterior side. In old specimens the mark of the mantle is deeply impressed, running parallel to the outer edge.

Nucula,* *Lamarck*, 1799.

Glycimeris (sp.). *Da Costa*, 1778.
Tellina and Donax (sp.). *Gmel.*
Arca (sp.). *Linn.*
Polyodonta. *Megerle*, 1811.

Generic Character. Shell equivalve, very inequilateral, ovato-trigonal, generally transverse, closed, nacreous, and in the recent state covered with an epidermis; often smooth, sometimes striated, or variously ornamented upon the exterior: hinge line more or less angular, furnished with a series of sharp, elevated, and angulated teeth, arranged on each side of the umbones, interrupted by a central and internal spoon-shaped projection, upon which is placed the ligament. Impression by the mantle without a sinus.

Animal of the form of the shell, having the edges of its mantle plain disconnected, and without siphonal tubes. Foot large, and capable of expanding into an ovate, pedunculated disc, with fimbriated edges, and by means of this organ it is capable of a considerable degree of locomotion, creeping like a Gasteropod at the bottom of the water.

* Etym. *Nucula*, a little nut.

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Since the original establishment of the genus by Lamarck, it has been much curtailed, and is now restricted to those shells with a pectiniform or denticulated hinge, having the posterior portion, as it were, cut off; the lines of denticulations forming nearly a right angle, and the animal being without the posterior siphonal tubes; consequently there is no indentation in the impression formed by the muscles of the mantle.

The genus thus restricted is in a recent state rather sparingly distributed, although found in the seas of both hemispheres. As fossil, it has been obtained low in the Secondary Formations.

The species in a living condition are inhabitants of the sea at all depths, some being found near low water mark, while others are truly pelagian, and have been observed in the deepest regions Mollusca are known to frequent. Mr. Garner, in his 'History of the Lamellibranchiata,' says, there is a distinct pinnate process in the mantle of the animal, for the purpose of secreting the numerous teeth of the hinge; these teeth are prominent, sharp pointed, and angular, the angle being directed towards the umbo from both sides.

1. NUCULA LÆVIGATA, *J. Sowerby*. Tab. X, fig. 8, *a—b*.

NUCULA LÆVIGATA.		*J. Sow.* Min. Conch., t. 192, figs. 1, 2, 1818.
—	—	*Goldf.* Pet. Germ., vol. ii, p. 157, pl. 125, fig. 19, *a—c*.
—	—	*S. Wood.* Illust. Mag. Nat. Hist., New Series, vol. iv, p. 296, 1840.
—	—	*Id.* Catalogue, 1840.
—	—	*Nyst.* Add. à la Faune Conch. de Belg. (Bull. Acad. de Brux, t. ix, p. 450), 1842.
—	—	*Morris.* Cat. Brit. Foss., p. 94, 1843.
—	—	*Nyst.* Coq. Foss. de Belg., p. 228, pl. 17, fig. 8, *a—b*, 1844.

Spec. Char. Testâ transversâ, ovatâ, valdè inæquilaterâ, lævigatâ, tenui, margaritaceâ, clausâ; anticè brevi, subangulatâ; posticè productiore, rotundatâ; margine ventrali integerrimo.

Shell, transverse, ovate, very inequilateral, smooth, thin, nacreous, and closed; anterior side short, sloping, or angulated; posterior much produced and rounded; ventral margin without crenulations.

Longest diameter, $1\frac{3}{8}$ths of an inch; *height*, 1 inch.

Locality. Cor. Crag, Sutton.
Red Crag, Walton Naze.

This is the largest species of the genus that I am acquainted with, either in the recent or fossil state, it appears to have attained its full development in the Red Crag, as in the Deposits of that Period at Walton Naze specimens are by no means rare; it is found also in the older or Coralline Crag, where, however, they are few in number and small in size.

M. Deshayes has quoted this as synonymous with *N. ovata*, an Eocene species from

the Paris Basin; there are, however, marked differences between the two, sufficient to keep them specifically distinct. The older shell has a crenulated margin, with other characters of minor importance by which it may also be distinguished, while the Crag one has its margin perfectly smooth. A shell in the Cabinet of Mr. D'Urban, found in the Eocene Formation at Bracklesham, strongly resembles our species, in having its margin free from the slightest appearance of crenulations, but it differs in being rather less transverse and more tumid, with the posterior ventral margin less angular and pointed, approaching in the last character the specimens from the Coralline Crag; these differences appear to be sufficient for specific distinction, and, as yet, I have not seen any shell with which it can be fairly identified; the exterior of our Crag shell is smooth and glossy in specimens the surface of which has not been at all eroded, and it was, in a recent condition, most probably covered with an epidermis. On the anterior dorsal margin there is a rather narrow row of prominent angular teeth, varying from 20 to 35; while on the short or posterior side the teeth are broader and closer, and in number about 10 or 12, with a deeply impressed lunule on the posterior or shorter side. There is no other exterior marking than the lines of growth, but when the glossy surface is removed, the shell appears to have a radiated fibrous structure, and the interior is often faintly rayed; a long subangular depression for the ligament curves inwardly towards the anterior, adhering to the inner edge of the dorsal margin. The dorsal as well as the ventral margins are rounded, giving an ovate form to the shell, only truncated on the posterior side, where the ventral margin forms a sort of incipient rostrum, connecting it in that character with the following genus, though less so than in some other species.

2. NUCULA COBBOLDIÆ, *J. Sowerby*. Tab. X, fig. 9, *a—b*.

NUCULA COBBOLDIÆ.		*J. Sow.* Min. Conch. t. 180, fig. 2, 1818.
—	—	*Woodward.* Geol. of Norf., p. 44, 1833.
—	—	*Lyell.* Mag. Nat. Hist., New Series, vol. iii, p. 328, 1839.
—	—	*Id.* Elem. Geol., p. 299, fig. 113, 2d. ed., 1841.
—	—	*S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 295, 1840.
—	—	*Id.* Catalogue, 1840.
—	—	*G. B. Sowerby.* Genera, No. 17, fig. 9.
—	—	*Forbes.* Geol. Surv. Gr. Brit., p. 83, 1846.
—	—	*Morris.* Cat. Brit. Foss., p. 94, 1843.

Spec. Char. Testâ transversâ, obliquè-ovatâ, convexâ, clausâ; irregulariter radiatâ, aut lineolis flexuosis ornatâ; intus sæpè incrassatâ; margine integerrimo.

Shell transverse, obliquely ovate, convex, thick and closed; sculpture on the exterior, with irregular radiations or lines in a divaricating or zig-zag direction; interior often irregularly thickened, margin smooth.

Longitudinal diameter, $1\frac{1}{8}$ inch. *Height*, 1 inch.

Locality. Red Crag, Sutton, Bawdsey, near Ipswich, and Felixstow.
Mam. Crag, Thorpe, Bramerton, Chillesford, Bridlington.

This species has not, as yet, I believe, been found in any Formation older than the Red Crag, in which it does not seem to have been very abundant, but in the Deposits of the succeeding period it may be obtained in large numbers, in the portion of that Formation resting upon the Red Crag at Chillesford, where the valves are sometimes found united, and in their natural position.

There is no species known with which this is likely to be confounded, as its peculiar sculpture differs from that of any recent *Nuculæ* inhabiting the Northern Hemisphere, or of any of our well-known Tertiary species. Two fossils found in the Cretaceous Formations (*N. bivirgata* and *ornatissima*), possess similar ornament, and a recent species has been also obtained from a considerable depth off the Cape of Good Hope, which is covered with zig-zag striæ, these however have no specific relationship with our shell.

This species, although one of the finest belonging to the genus, has not attained quite so great a magnitude as the preceding one, my largest specimen does not exceed one inch and an eighth in its transverse or largest diameter, while the other has reached to an inch and three eighths. Like most of the shells from the Crag, it varies somewhat considerably in its proportional dimensions. In those which are most tumid, the diameter is less from the dorsal to the ventral margin, than it is in those which are more compressed. The number of teeth are generally from sixteen to eighteen on the anterior side, with about ten upon the shorter or posterior slope, they are prominent and sharp, of an angular form, and interlocking, and the fossette for the ligament is large, projecting inwardly, inclining beneath the dorsal edge towards the anterior side, and the umbo is terminal, and somewhat pointed. This species is sometimes much thickened internally in aged specimens, forming deeply indented impressions by the adductors, which are of a sub-circular form inclining to oval, and the marginal impression of the mantle is then ornamented with radiations like those in some of the *Lucinæ*, but the margin of the shell is smooth, and free from crenulations.

This pretty shell is ornamented upon the exterior with irregularly divaricating striæ, which generally, in the young state, have only one series of diverging lines, but in the centre part of the older specimens they are more irregular, and become zig-zag, with two, three, or more angular points of divergence, the radiations are large and rounded, and crossed by transverse or very perceptible lines of growth, and the shell when living was probably covered by an epidermis.

In some specimens the umbo is much eroded, while in others it is quite perfect.

3. NUCULA TENUIS, *Montague*. Tab. X, fig. 5, *a—b*.

ARCA TENUIS. *Mont.* Test. Brit. Suppl., p. 56, t. 29, fig. 1, 1808.
— — *Pennant.* Brit. Zool., vol. iv, p. 218, fide *Gould.*
— — *Dillw.* Desc. Cat. Rec. Shells, p. 246, 1817.
— — *Turt.* Conch. Dict., p. 11, 1819.
— — *W. Wood.* Ind. Test., ARCA, p. 47, pl. 10, fig. 45, 1825.
NUCULA TENUIS. *Turt.* Brit. Biv., p. 177, 1822.
— — *Flem.* Brit. Ann., p. 402, 1828.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 25, fig. 13, 1827.
— — *Gould.* Inv. Massach., p. 105, fig. 64, 1840.
— — *Möller.* Ind. Moll. Groën., p. 17, 1842.
— — *Mac Gill.* Moll. Aberd., p. 244, 1843.
— — *Morris.* Cat. Brit. Foss., p. 95, 1843.
— — *Thorpe.* Brit. Mar. Conch., p. 105, 1844.
— — *Forbes.* Geol. Surv., vol. i, p. 83, 1842.
— — *Hanley.* Rec. Shells, vol. 1, p. 171, pl. 10, fig. 45.
— — *Alder.* Cat. Moll. North. and Durh., p. 79, 1847.
— — *Lovén.* Ind. Moll. Scand., p. 34, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 223, pl. 47, fig. 6 (Animal), pl. P, fig. 5, 184 9.
— TENERA. *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 295, pl. 14, fig. 2.
— RYCKHOLTIANA? *Nyst.* Coq. Foss. de Belg., p. 233, pl. 15, fig. 10, *a—b*, 1844.
— DECIPIENS. *Phil.* En. Moll. Sic., vol. ii, p. 48, t. xv, fig. 15, 1844.
— LUCIDA. *Blanding.* MSS. fide *Gould.*

Spec. Char. Testâ ovatâ, trigono-ellipticâ, lævigatâ, tenui, latere antico subangulato; lunulâ parum distinctâ, margine ventrali arcuato, integro.

Shell ovate, elliptically triangular, smooth, and thin; anterior side produced, roundedly angular; lunule not well defined, ventral margin smooth.

Diameter, ½ an inch.

Locality. Cor. Crag? Gedgrave.
Red Crag, Bawdsey.
Mam. Crag, Bridlington, Chillesford.
Recent, Mediterranean, Britain, Scandinavia, and North America.

Two specimens of a species resembling this are in my Cabinet, they were obtained from the Coralline Crag, but are too imperfect for correct determination. In the Red Crag Formation it has undoubtedly made its appearance, several individuals were found by myself, and in the sandy deposit at Chillesford it is an abundant shell seemingly increasing in numbers towards the present Period. Its greater tenuity and more ovate form will distinguish this from *N. nucleus*, as well as the absence from the margin of all crenulations. It differs from the young of *N. lævigata* in being less transverse, that species having a greater diameter when measured from the anterior to the posterior margin, the hinge line also forms a greater angle than in *tenuis*, and the posterior termination is somewhat produced. In this species the anterior dorsal margin is more rounded than in any of the others, so is the ventral margin,

giving a more ovate form to the outline. It has a rather narrow row of denticles on both sides, those upon the anterior are from ten to twelve in number, with about six or eight upon the shorter or posterior side. A shell somewhat resembling this is found in the Upper Marine, in Headon Hill, being free from crenulations at the margin, and is also a thin shell, with a similar ovate contour, though seemingly rather more pointed at the posterior extremity, but my specimens of the Eocene fossil are scarcely in a sufficiently good state of preservation for a fair comparison.

A specimen of this species, found at Bridlington, was obligingly forwarded to me for examination by Mr. Leckenby.

4. NUCULA NUCLEUS, *Linnæus*. Tab. X, fig. 6, *a—b*.

ARCA NUCLEUS. *Linn.* Syst. Nat., ed. 12, No. 184, p. 1143, 1767, not *Brander*.
— — *Chem.* Conch. Cab., t. vii, p. 241, t. 58, fig. 574, 1784.
— — *Don.* Brit. Shells, vol. ii, pl. 63, 1801.
— — *Broc.* Conch. Foss. Subap., vol. ii, p. 480, 1814.
— — *W. Wood.* Ind. Test., p. 47, pl. 10, fig. 42, 1825.
NUCULA NUCLEUS. *Turt.* Brit. Biv., p. 176, t. 13, fig. 4, 1822.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 294, pl. 14, fig. 1, 1840.
— — *Thorpe.* Brit. Mar. Conch., p. 105, p. 74, 1844.
— — *Lovén.* Ind. Moll. Scand., p. 34, 1846.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. ii, p. 215, pl. 47, figs. 7, 8, 1849.
— MARGARITACEA. *Lam.* Syst. des An. s. Vert., p. 115, 1801 (mostly).
— — *G. B. Sowerby.* Genera, No. 17, fig. 7.
— — *De Blainv.* Malac., pl. 75, fig. 5, 1825.
— — ? *Bast.* Mem. de la Soc. d'Hist. Nat., t. 2, p. 78, No. 2, 1825.
— — *Payr.* Cat. Moll. Cors. p. 64, 1826.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 25, fig. 12, 1827.
— — *Dubois.* Conch. Foss. Wolhyn. Podol., p. 66, t. 7, figs. 35, 36, 1831.
— — *Goldf.* Pet. Germ., vol. ii, p. 158, t. 125, fig. 21, *a—d*.
— — *Phil.* En. Moll. Sic., vol. i, p. 64, t. v, fig. 8, 1836.
— — *Bronn.* Leth. Geol., vol. ii, p. 929, t. 39, fig. 5, *a—c*, 1838.
— — *Swains.* Malac., p. 382, fig. 125, *f—g*, 1840.
— — *G. B. Sow., Jr.* Conch. Man., fig. 137, 1842.
— — *Forbes.* Report on Ægean Invert., p. 180, 1843.
— — *Sism.* Syn. Meth. An. Inv. Piedm. Foss., p. 15, 1847.
— ARGENTEA? *Brown.* Illust. Conch. Gr. Brit., pl. 25, figs. 14, 15, 1827.
GLYCIMERIS ARGENTEA. *Da Costa.* Brit. Conch., p. 170, pl. 15, fig. 6, 1778.
DONAX ARGENTEA. *Gmel.* Syst. Nat., p. 3265, 1788.
Ency. Meth., pl. 311, fig. 3, *a—b*.

Spec. Char. Testâ obliquâ, ovatâ, transversâ, subtriangulari, lævi, aut obsoletè striatâ; dentibus cardinalibus acutis; margine crenulato.

Shell obliquely ovate, transverse, slightly triangular, smooth or obsoletely striated; hinge with numerous, sharp, and erect teeth; margin crenulated.

Diameter, $\frac{5}{8}$ths of an inch.

Locality. Cor. Crag, Sutton, Ramsholt, Sudbourn, Gedgrave.
Red Crag, Sutton, Bawdsey.
Recent, Mediterranean, Britain, and Scandinavian Seas.

Specimens of this species may be plentifully obtained in the lower or Coralline Crag Deposit, especially at Gedgrave, where it appears to have been abundant, and the numerous prominent and interlocking teeth being favorable for the preservation of the valves in their natural position, they are frequently found united.

Considerable variation may be observed in comparing numerous individuals, some of which closely approach what is called a species in the recent state under the name of *nitida*, these differences consist principally in the proportionate dimensions, the posterior side occasionally projecting more in some specimens than in others, and in a greater solidity of shell. Faint traces of radiating striæ ornament the exterior, they are most visible near the margin, these lines are also visible within; the number of crenulations slightly vary, being smaller and closer of course in the younger shell, and in this state the contour is generally more rounded, the posterior side in particular being less truncate.

A species somewhat closely allied to this is found in the upper part of the Older Tertiary Formations at Hordwell, and in the Isle of Wight, but it is probably distinct. It is thinner, the hinge line narrower and more regular, with fewer teeth, while in *N. nucleus* it is much broader as it approaches the anterior side, and the posterior margin is rather less rounded.

A shell from the Upper Tertiaries of the United States strongly resembles this species, and may, when better known, prove to be an identity.

5. NUCULA TRIGONULA, *S. Wood.* Tab. X, fig. 7, *a—b.*

NUCULA TRIGONULA. *S. Wood.* Illust. Mag. Nat. Hist., vol. iv, New Series, p. 295, pl. 14, fig. 3.
— — *S. Wood.* Catalogue, 1840.
— — *Morris.* Cat. Brit. Foss., p. 95, 1843.

Spec. Char. Testâ minutâ, trigonulâ, lævigatâ, tumidâ, margaritaceâ; anticè subangulatâ, posticè abbreviatâ, margine ventrali crenulato.

Shell small, trigonular, smooth, tumid, nacreous, anterior side roundedly angular, posterior side very short, ventral margin crenulated.

Longitudinal diameter, $\frac{3}{8}$ths. *Height*, $\frac{1}{4}$ of an inch.

Locality. Cor. Crag, Sutton.

About a dozen specimens with a much more angular or trigonal form than is presented by the normal character of *N. nucleus*, are in my cabinet from the Cor. Crag, which induced me, when publishing the Crag species of this family, to consider them as belonging to a distinct species, and I am still inclined to retain them as such, from a very marked difference in the outline; it is nevertheless possible they may be nothing more than specific variations, the result of some local condition; they possess,

however, sufficient difference to remain as specimens of a distinct variety, should they be hereafter degraded from their isolated position. I have seen this species from the Coralline Crag only, where *N. nucleus* is found in abundance, and of all sizes, but none of which seem to form any very close connection with this shell. British Conchologists retain as distinct in this genus forms with less variation of character than what is exhibited in our fossil specimens.

Nucula nitida, Sow., appears to offer less pretensions for specific distinction, than are presented by the angulated outline of our fossil, but probably the whole three will merge into one species.

Nucula proxima of American authors, according to figures and descriptions, much resembles our fossil, and is probably only another specific variation of a shell with a very extended range.

Nucula radiata, Hanley, differs nothing in form from some of our Crag specimens, and if it be a distinct species, may also have been in existence during that early period.

Leda,* *Schumacher*. 1817.

Nucula (sp.). *Lam.*, 1801.
Arca (sp.). *Mont.*, 1803.
Lembulus. *Leach*, MS. 1819.
Lembula (sp.). *Risso*, 1826.
Dacromya. *Agass.*, 1839.
Yoldia. *Möller*, 1842. *Lovén*, 1846.
Leda. *Lovén*, 1846.
Moldia. *Gray*, 1847 (misprint).

Generic Character. Shell equivalve, inequilateral, elliptical or fig-shaped, posteriorly more or less angulated or acuminated; smooth or transversely striated, covered by an epidermis in the recent state; umbones small, approximate. Hinge furnished with numerous teeth arranged in a linear series, curved or slightly angular, interrupted in the centre, or immediately beneath the beaks by a triangular fossette for the reception of the ligament; impressions by the muscles ovate or subangular, that by the mantle more or less sinuated.

Animal transversely ovate, mantle open in front with simple, sometimes fimbriated, margins; foot large and discoidal, with serrated edges; posterior side of the mantle prolonged into two, partially united, slender and unequal siphonal tubes.

The genus *Nucula*, as established by Lamarck, was intended to contain all those shells which had a hinge furnished with a line of sharp prominent teeth, separated at the umbo by an angular depression for the reception of the ligament, and placed

* Etym., a proper name.

within the margin of the shell, many of these have the posterior portion, as it were, cut off or wanting, in which the animal is entirely without the protruding siphonal tubes, and the impression of the mantle is therefore entire, this section constitutes our genus *Nucula*, the type of which is *Arca nucleus*, Linn. Many species formerly included have a prolonged posterior side, making the shell sometimes nearly equilateral, and the animal is then furnished with elongated siphonal tubes. This was originally proposed by Schumacher, under the name of *Leda*, without his being at all aware of the essential difference, as the only reason assigned for the division was that these shells were more nearly related to *Pectunculus* (Essai d'un Nouv. Syst. des Vers. Test. p. 173).

Möller divided these latter or bilateral Nuculæ into two genera, without, however, any apparent distinction, either in the shell or animal; *Nucula arctica*, the species he intended as the type of his genus *Yoldia*, being furnished with a sinuated impression like that of *N. minuta* (the typical form of *Leda*), indicating the possession of protruding siphons in the animal of that species; neither does the form of the exterior present any essential difference.

These resemblances were more especially pointed out by Professor E. Forbes, in his valuable essay in the first vol. of the 'Memoirs of the Geological Survey,' p. 418, where the two genera are united.

Shells possessing the form and characters assigned to this genus are found in some of our oldest formations, and are continued through the more modern Periods.

1. LEDA LANCEOLATA, *J. Sowerby*. Tab. X, fig. 16, *a—b*.

NUCULA	LANCEOLATA.	*J. Sow.* Min. Conch., t. 180, fig. 1, 1817.
—	—	*Morris.* Cat. of Brit. Foss., p. 94, 1843.
—	OBLONGA.	*G. B. Sowerby.* Genera, No. 17, fig. 6.
—	—	*Woodward.* Syn. Tab. Brit. Org. Rem., p. 15, 1830.
—	—	*S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 296, 1840.
—	ARCTICA.	*Brod.* and *Sow.* Zool. Journ., No. xv, p. 359. t. ix, fig. 1, 1829.
—	—	*Middendorff.* Mem. de l'Acad. Imp. de St. Petersb. p. 544, 1849.
YOLDIA	ARTICA.	*Möller.* Ind. Moll. Groen., p. 18, 1842.

Spec. Char. Testâ transversâ, elongato-ovatâ, inæquilaterâ, crassâ; anticè majore et latiore elliptico-rotundatâ, posticè subrostratâ; externè striatâ, striis transversis obliquis, dentibus crassis angulatis.

Shell transverse elongato-ovate, inequilateral, thick and strong, anterior side the larger and broader, elliptically rounded; posterior subrostrated; externally striated, striæ broad and oblique, teeth thick and angulated.

Longitudinal diameter, $2\frac{1}{4}$ inches.

Locality. Red Crag, Bawdsey.

Mam. Crag, Chillesford. Recent, Arctic Seas.

This species in the recent state appears to be restricted to colder regions of the northern hemisphere, and is essentially a Boreal species. In the Red Crag it is by no means abundant, and until the discovery of the native bed at Chillesford, resting upon the Red Crag, it was considered a shell of great rarity in our cabinets, but at this latter locality it may now be obtained in considerable numbers, and the specimens have there seemingly reached their full development in regard to size, some of mine having a magnitude of two inches and a quarter in the longest diameter. This and *Mya truncata* are the most characteristic as well as the most abundant species in that Deposit. The anterior side of the shell may be described as forming nearly half a regular ellipsis, and the posterior side is smaller and rostrated; the pointed termination curving a little upwards; a large lanceolated corselet or flattened space occupies nearly the whole length of the posterior slope, and a smaller or more narrow one is generally to be seen at the dorsal margin on the anterior side; the number of teeth are variable, generally about twenty on the posterior, and thirty on the anterior side, they are large, prominent, sharp, and angular, with serrated edges, the lateral teeth are more distant from each other than those nearer the umbo; this is the number in the adult shell; in the younger state they are less numerous, additions being made to their amount as the animal enlarges; a sinus with two or three obsolete rays curves over the anterior side at some little distance from the dorsal margin, produced probably by the protrusion of a peculiarly formed foot at that part of the edge of the shell; coarse lines of growth cover the exterior, and these are cut at a small angle by ridges which cross the shell in an oblique direction from the anterior to the posterior ventral margin; but not extending over the dorsal portion of the shell on either side: in some aged specimens, the interior is irregularly and ruggedly thickened, leaving deep impressions on those parts to which the muscles of the animal were attached: that of the adductor on the anterior side is large and angularly ovate, and not far from the extremity, the posterior one is smaller, and situated more within the shell; the curve formed by the retrocession of the siphonal tubes is rather variable, extending in some specimens as far as the middle of the ligamental area. The principal variation to which this species appears to be subject is merely in the proportional dimensions.

The name proposed by Mr. J. Sowerby has priority of date over that employed by Lamarck for a very different species, which was published in 1819, and as such it is retained here for the Crag Fossil; and for the shell, therefore, so called by Lamarck, I would substitute that of *cultrata*.

2. LEDA MYALIS, *Couthouy*. Tab. X, fig. 17, *a—c*.

NUCULA MYALIS. *Couth.* Bost. Journ. Nat. Hist., vol. ii, p. 62, pl. 3, fig. 7, 1839.
— — *Gould.* Invert. of Massach., p. 99, 1841.
— — *Dekay.* Hist. New York Zool., p. 180, pl. 13, fig. 219, 1843.
— OBLONGA ? *Woodward.* Geol. of Norf., p. 44, 1833.
— allied to OBLONGA. *Lyell.* Mag. Nat. Hist., New Series, p. 328, 1839.
— OBLONGOÏDES. *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 297, pl. 14, fig. 4, 1840.
— — *Morris.* Cat. Brit. Foss., p. 95, 1843.
— — *Forbes.* Mem. Geol. Surv., vol. i, p. 420, 1846.
— HYPERBOREA. *Lovén*, sec. *Gould.*
YOLDIA ANGULARIS. *Möller.* Ind. Moll. Gröenl., p. 19, 1842.

Spec. Char. Testâ transversâ, inæquilaterâ, elongato-ovatâ, tenui; anticè elliptico-rotundatâ, posticè subrostratâ; lævigatâ; dentibus mediocriter angulatis.

Shell transverse, inequilateral, elongato-ovate, thin, and externally smooth; anterior side roundly elliptical, posterior subrostrated; externally smooth; teeth moderately angulated.

Longitudinal diameter, $1\frac{3}{4}$ inch. *Height*, 1 inch.

Locality. Red Crag, Sutton and Butley.
Mam. Crag, Chillesford and Bramerton. Recent, North America.

This species, like the preceding one, appears in the recent state to be confined to the colder regions of the globe, and as a fossil has been found only in the newer Tertiaries in this country. In the Red Crag I have met with but very few specimens, while at Chillesford it may be obtained in abundance, and is by no means scarce, I believe, in the Estuary portion of the Mammaliferous Crag at Bramerton. It is readily distinguished from *L. lanceolata*, in being more equilateral, the posterior portion is comparatively larger, and it wants the peculiar diagonal ridges which ornament the surface of that shell; nor does it appear even to attain to such dimensions, my largest specimen being under two inches in its transverse or longest diameter, neither is it ever so thick a shell. A specimen obtained in the Red Crag at Sutton is more elongated or attenuated than those usually found at Chillesford, and it approaches in that character *L. limatula* of the American Seas (fig. 17, *c*); but that species is rather more elegantly formed, and more rostrated, with a greater curvature at the posterior termination. Our shell is covered with concentric striæ or lines of growth, but not in regular ridges, and there is not so distinct a sinus on the anterior side, as in *L. lanceolata*, although in some specimens a radiating line traverses that side of the shell from the umbo, which line is produced by a slight interruption to the regular curve of the margin: a large corselet is well defined on the posterior side, and the ligamental pit is comparatively larger than in *L. limatula*. The shell is sometimes thickened in the interior, though never

so much so as in *L. lanceolata*, and the muscular marks are then deeply impressed, those produced by the adductors are of a subovate form, and are unequal in size, the anterior one being the larger, and the sinus formed by the mantle extends about as far inwardly as the posterior part of the ligamental pit, which is broad and contracted in the centre.

Our shell appears to correspond with the recent American species to which it is here assigned, in all its characters, excepting size. Dr. Gould gives the dimensions of his shell as $1\frac{1}{10}$ inch in its largest diameter, which is considerably less than the magnitude to which our fossil has attained. In the recent state it is generally eroded at the beaks; our fossil does not appear to have been at all acted upon at that part, it is there quite perfect.

A shell from the Antarctic Seas, *N. Eightsii, Couthouy*, strongly resembles our British fossil.

3. LEDA SEMISTRIATA, *S. Wood.* Tab. X, fig. 10, *a—b.*

NUCULA SEMISTRIATA. *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 297, pl. 14, fig. 5, 1840.

— NITIDA. *Nyst.* Rech. Coq. Foss. d'Anv., p. 16, pl. 3, fig. 62, 1835, (not *Brocchi.*)

— DEPRESSA. *Nyst.* Coq. Foss. de Belg., p. 220, pl. 15, fig. 7, 1844.

Spec. Char. Testâ transversâ, ovato-ellipticâ, subæquilaterâ, compressâ, tenuissimi, fragili; anticè rotundato-ovatâ et lævigatâ, posticè subrostratâ et transversim striatâ; natibus approximatis, margine integerrimo.

Shell transverse, elliptically ovate, subequilateral, compressed, thin, and fragile; anterior side roundly ovate and smooth; posterior subrostrated and transversely striated; beaks approximate, margin quite smooth.

Longest diameter, 1 inch.

Locality. Cor. Crag, Sutton and Ramsholt.

This shell is abundant in the Coralline Crag at Sutton, but from its great fragility specimens of the above dimensions are very rarely obtained, and if it be the same as the Belgian fossil, which I presume is the case, M. Nyst speaks of it as being by no means rare in the Campinian Beds.

The striæ or transverse ridges upon our shell are rounded and obtuse, not sharp or imbricated; they cover the posterior half of the exterior, extending from a little beyond the centre or umbo to the extremity, but often become irregular and obsolete upon the posterior slope, and the shell is there depressed and subsinuated with a very slightly recurved and somewhat pointed termination at the extremity of the dorsal edge. From the extreme thinness of the shell the transverse edges are often visible in the interior; a long line of sharp angularly formed and prominent teeth occupy the hinge area, amounting in large specimens to as many as five and twenty on the anterior, with twenty or more on the opposite side, while in young ones they are not above half that number: they are separated by a rather large and obtusely angular

ligamental pit, somewhat contracted in the middle; a large lanceolate-formed and well defined lunule and corslet may be seen on both sides of the umbo, but the muscle marks within are very slightly impressed and are indistinct, with doubtful traces of a deeply sinuated form in the one by the mantle.

I am not at all acquainted with the range of this species; but it does not appear to have a specific relationship with *Nucula lævis*, Say, with which M. Nyst has considered his shell identical, and to which he would also unite *N. limatula*, a very different species. It resembles in outline *N. sapotilla*, Gould, but seems to differ specifically from it in the conspicuous transverse ridges, as well as in having a greater number of teeth, depending upon the figure and description of that very accurate observer, Dr. Gould, who would undoubtedly have pointed out the exterior ornament had it possessed any.

4. LEDA CAUDATA, *Donovan*. Tab. X, fig. 12, *a—b*.

ARCA CAUDATA. *Don.* Brit. Shells, vol. iii, pl. 78, 1802.
— MINUTA. *Mont.* Test. Brit., p. 140, 1803, not *Broc.*
— — *Turt.* Conch. Dict., p. 11, fig. 98, 1819.
— — *W. Wood.* Ind. Test., p. 47, pl. 10, fig. 44, 1828.
NUCULA MINUTA. *Turt.* Brit. Biv., p. 178, 1822.
— — *Brown.* Illust. Conch. Gr. Brit., pl. 25, fig. 18, 1827.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 298, pl. 14, fig. 6, 1840.
— — *Gould.* Invert. Massach., p. 101, 1841.
— ROSTRATA. *G. Sowerby.* Genera No. 17, fig. 5.
— — *Mac Gill.* Moll. Aberd., p. 245, 1843.
LEDA MINUTA. *Möller.* Ind. Moll. Groenl., p. 17, 1842.
— — *King.* Ann. Nat. Hist., vol. xviii, p. 240.
— — *Forbes.* Mem. Geol. Surv., vol. i, p. 419, 1846.
— CAUDATA. *Lovén.* Ind. Moll. Scand., p. 34, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 79, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 226, pl. 47, figs. 12, 13, and pl. P, fig. 2, 1849.

Spec. Char. Testâ transversâ, elongato-ovatâ, vel ficiformi, convexiusculâ, tenui; concentricè striatâ, anticè breviori, rotundatâ; posticè longiori attenuatâ, angulatâ, et subrostratâ, margine integro.

Shell transverse, elongato-ovate or fig-shaped, slightly convex, thin; covered with transverse or concentric striæ; anterior side the shorter, rounded, posterior attenuated, angulated, and subrostrated, margin smooth.

Longitudinal diameter, ½ an inch nearly.

Locality. Red Crag, Sutton.
Mam. Crag, Bridlington.
Clyde Beds. Recent, Britain, Scandinavian Seas, and North America.

I have seen but one specimen of this species from the Red Crag, which was found by myself nearly twenty years since, and I presume it, therefore, to be rare in that Deposit; one specimen also from the Cabinet of Mr. Leckenby, found at Bridlington, appears to belong to the same species, and they are both assigned to the recent British one, and to the more ventricose or less transverse variety: specimens of the recent shell, corresponding in every respect with our Crag fossil, have been obtained by myself on the shore at low water on the Coast of Suffolk, and I have no hesitation in pronouncing upon their identity.

5. LEDA PERNULA, *Müller*. Tab. X. fig. 13, *a—c*.

ARCA PERNULA. *Müll.* Besch. Berl. Naturf. Fr., iv, 57, 1779, fide *Lovén.*
— MARTINI. *Chem.* Conch. Cab., t. vii, t. 206, fig. 550, 1784.
— ROSTRATA. *Gmel.*, fide *Lovén.*
— — *W. Wood.* Ind. Test., p. 47, pl. 10, fig. 43, 1825.
— FLUVIATILIS. *Schröt.* Flusc., p. 187, pl. 9, fig. 2, fide *Desh.*
NUCULA FLUVIATILIS. *G. Sowerby*, Genera No. 17, fig. 3.
— OBLONGA. *Brown.* Illust. Conch. Gr. Brit., pl. 25, fig. 17, 1827.
— ROSTRATA. *G. Sowerby.* Conch. Illust., fig. 12.
— — *Desh.* 2d ed. Lam., t. vi, p. 504, 1835.
— JACKSONI? *Gould.* Inv. Massach., p. 102, fig. 65, 1841.
— — *Dekay.* Nat. Hist. New York Zool., p. 181, pl. 12, fig. 213, 1843.
— TENUISULCATA. *Couth.* Bost. Journ. Nat. Hist., vol. ii, p. 64, pl. 3, fig. 8, 1839.
LEDA ROSTRATA. *Forbes.* Mem. Geol. Surv., p. 420, 1846.
— — *Schum.* Essai, &c., p. 173, pl. 19, fig. 4, *a—b*, 1817.
— PERNULA. *Lovén.* Ind. Moll. Scand., p. 34, 1846.

Spec. Char. Testâ transversâ elongatâ, anticè rotundatâ, posticè duplo longiori, in rostrum obtusum attenuatâ, concentricè striatâ.

Shell transverse, elongate, anterior side rounded, posterior twice the length and attenuated, terminating in an obtuse beak, concentrically striated.

Longest diameter, $\frac{7}{8}$ths of an inch.

Locality. Mam. Crag, Bridlington.
Clyde Beds.

One specimen (fig. 13, *c*) belonging to Mr. Bean, found at Bridlington, and obligingly lent to me by that gentleman for the purpose of description, appears to be somewhat different from the preceding, it corresponds with the recent form found in the Boreal Seas of Europe, and which is most probably also a native of the Northern Coast of America. Our fossil is not in good condition, being compressed and slightly broken, and its natural form in consequence somewhat distorted, but it is sufficiently perfect to permit of a presumed evidence of identity with the recent species. It is more inequilateral than the preceding species, larger, and with finer concentric striæ, corresponding with the figure and description of *N. tenuisulcata*, Couthouy, and of which, probably, *N. Jacksoni*, Gould, is only a variety. Fig. 13, *a*, *b*, is the representation of a specimen from the Clyde Beds, given to me by Jas. Smith, Esq., of

Jordan Hall; all the specimens I have seen from these Deposits are small, scarcely exceeding half an inch in length, while the one from Bridlington has nearly twice that diameter.

This appears to differ but very slightly from the more elongated variety of *L. caudata*, considered a different species by our British Conchologists, as well as by Dr. Lovén, the principal difference is in the striæ, which in this shell is finer or more numerous.

6. LEDA TRUNCATA, *Brown*. Tab. X, fig. 14, *a—b*.

NUCULA TRUNCATA. *Brown*. Illust. Conch. Gr. Brit., pl. 25, fig. 19, 1827.
— — *Smith*. Mem. Wern. Soc., vol. viii, p. 42, 1838.

Spec. Char. Testâ transversâ, ovatâ; concentricè striatâ, tumidâ, subæquilaterâ; anticè rotundatâ, posticè truncatâ vel subsinuatâ; umbonibus prominulis; margine integerrimo.

Shell transverse, ovate, subequilateral, tumid, concentrically striated; anterior side rounded, posterior truncate or subsinuated; umbones slightly prominent; margin smooth.

Length, $\frac{7}{8}$ths of an inch nearly. *Height*, $\frac{1}{2}$ an inch.

Locality. ———?

This shell has been rejected by the authors of the 'Hist. of British Mollusca' as an existing British species, and although not found in any of our Crag Deposits, belongs undoubtedly to the Upper Tertiaries of England. It is an animal still living in the Arctic Seas, but is no longer an inhabitant of our own.

The specimen figured was obtained by Robert M'Andrew, Esq., who has obligingly permitted me the use of it for the purpose of description: it was, he says, in company with other, supposed extinct, species as *Pecten Islandicus*, &c., and dredged from the depth of 40 to 60 fathoms, off the North Western Coast of the Isle of Skye. It is ornamented with close-set striæ, that appear independent of lines of growth, as they occasionally bifurcate, and are not, therefore, quite parallel to the margin; its most peculiar character is on the posterior side, where there is a somewhat angular ridge or keel from the umbo to the projecting beak-like termination, forming above a large and elongate lunule-like space between it and the margin of the shell; below is another obtuse ridge extending from the umbo to the posterior part of the ventral margin, and between this and the pointed termination, the shell is flattened or slightly contracted at the margin, from which it is presumed it received its name: the shell is tumid, the umbones somewhat curving over, so that the ligamental area projects inwards; there are from 12 to 18 teeth on each side, while the sinus in the mantle is not very deep: the specimen is a full grown or aged individual, as the interior is irregularly thickened, and more especially rugose between the margin of the shell and the line of attachment by the mantle.

7. LEDA PYGMÆA, *Münster*. Tab. X, fig. 11, *a—b*.

NUCULA PYGMÆA. *Munst.* Apud. Goldf. Pet. Germ., vol. ii, p. 157, t. 125, fig. 17.
— — *S. Wood.* Mag. Nat. Hist., New Series, vol. iv, p. 298, pl. 14, fig. 7, 1840.
— — *Phil.* En. Moll. Sic., vol. ii, p. 46, 1844.
— — *Middendorff.* Mem. de l'Acad. Imp. de St. Petersb., p. 544, 1849.
— GIBBOSA. *Smith.* Mem. Wern. Soc., vol. viii, pl. 2, fig. 10, 1838.
— CORBULOIDES. *Id.* in *addendum.*
— TENUIS. *Phil.* En. Moll. Sic., vol. i, p. 65, pl. 5, fig. 9, 1836.
— — *Jeffreys.* Ann. Nat. Hist., vol. xix, p. 313.
— LENTICULA. *Möll.* Ind. Moll. Groenl., p. 17, 1842.
— PHILIPPIANA. *Nyst.* Coq. Foss. de Belg., p. 224, pl. 17, fig. 5, *a—c*, 1844.
LEDA PYGMÆA. *Forbes.* Mem. Geol. Surv., vol. i, p. 419, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 230, pl. 47, fig. 10, and pl. P, fig. 3, 1849.
YOLDIA PYGMÆA. *Lovén.* Ind. Moll. Scand., p. 35, 1846.

Spec. Char. Testâ minutâ, ovato-trigonulâ, subæquilaterâ; tumidâ, lævigatâ, politâ, clausâ; anticè ovato-rotundatâ, posticè subrostratâ; lunulâ indistinctâ; margine integerrimo.

Shell small, triangularly ovate, subequilateral, gibbous, smooth, glossy, and closed; anterior side roundedly ovate; posterior subrostrated, without a distinct lunule; margin very smooth.

Longitudinal diameter, $\frac{1}{6}$th of an inch.

Locality. Cor. Crag, Sutton, Ramsholt, Gedgrave.
Clyde Beds. Recent, Mediterranean? Britain, Scandinavia.

This species is found in several localities of the Coralline Crag, and very abundantly at Sutton. It may be further described as having a very broad hinge line furnished with 8 to 12 teeth on each side of the umbo, they are angular, large, and prominent in the centre of the area and towards the sides, with large interspaces for the interlocking of the teeth of the opposite valve, by which the two valves are often found in conjunction. The shell is very tumid, moderately thick and strong, and perfectly closed all round, it has a somewhat prominent umbo, and is without any defined lunule or corselet; the posterior side is generally though not always the larger, and its termination rather acuminated and a little curved upwards: the fossette for the ligament is very small, and the muscle marks not in general deeply impressed or well defined; that by the mantle has a small sinus. The shell is glossy both within and without, and slightly nacreous. My Crag specimens are small, not exceeding the sixth of an inch in the transverse or greatest diameter; but a few specimens from the Clyde Beds, obligingly given to me by James Smith, Esq., of Jordan Hall, appear to have attained larger dimensions, and are rather less equilateral.

This shell is given by Philippi, on the authority of Scacchi, as a species living in the Mediterranean, and it is also found fossil in the Upper Tertiaries of that part of the world.

The living animal has recently been obtained by Mr. M'Andrew, from the depth of nearly 50 fathoms, on a muddy bottom, in the Sound of Skye; and it is quoted by Lovén as an existing species on the Coast of Finmark, while Möller gives it from the Greenland Seas.

8. LEDA THRACIÆFORMIS, *Storer.* Tab. X, fig. 15.

NUCULA THRACIÆFORMIS. *Stor.* Bost. Journ. Nat. Hist., vol. ii, p. 122, 1838.
— — *Gould.* Invert. Massach., p. 97. fig. 66, 1841.
— — *Dekay.* Nat. Hist. New York (Zoology), p. 178, pl. 12, fig. 217, *a—b*, 1843.

Spec. Char. "*Testâ ovato-oblongâ, transversâ, nigrâ, crassâ; anticè rotundatâ, posticè truncatâ et compressâ, umbonibus prominentibus; cardine foveâ magnâ.*" (Storer.)

"Shell ovato-oblong, transverse, black, and thick; anterior side rounded, posterior truncated and compressed, beaks prominent, with a large ligamental pit."

The specimen figured, was obtained by R. M'Andrew, Esq., a gentleman to whom science is so largely indebted for a more correct knowledge of our native Marine Fauna. This novelty is the result of one of his very recent explorations in the Sound of Skye, and was dredged, he tells me, at the depth of about 50 fathoms, and found in association with *Leda truncata*, *Pecten Islandica*, &c., species supposed to have become extinct in our own Seas, though still existing in some other regions of the Northern Hemisphere: the specimen (although but a fragment, is a considerable portion of the shell), was consigned to Professor E. Forbes, who is also of opinion that it is identical with *Leda Thraciæformis*, and I am much indebted to those two gentlemen for the privilege of being the first to make it known as having once been an inhabitant of our own Seas; and although it be another, to which as a describer of the Crag species I may not strictly have a claim, it belongs at least to the bygone times, and comes into the province of the Palæontologist.

What remains of the specimen seems to justify its being considered as belonging to the species to which it is here assigned, although the most characteristic portion of the shell is destroyed; I have, therefore, copied the specific character from the original describer: it differs from *L. truncata* in being somewhat thinner and more compressed, but there is scarcely enough of the shell remaining to show satisfactorily the peculiar ridge on the posterior side sloping from the umbo to the extremity of the ventral margin: it is ornamented with concentric striæ, like *L. truncata*, and they are slightly wavy in their direction.

The specimens of this species hitherto recorded as having been found in the recent state were from the stomachs of the Cod and Sand-dab, and these fishes were taken at the depth of 30 fathoms and upwards.

The outline tracing is copied from the figure of the recent shell in Dr. Gould's 'Invertebrata of Massachusets.'

Unio, *Retzius*, 1788.

Mya (sp.). *Linn.*, 1747.
Triquetra. *Klein*, 1753.*
Limnæa and Limnæoderma (sp.). *Poli.*, 1791.
Cristaria. *Schum.*, 1817.
Paxyodon. *Id.* „
Prisodon. *Id.* „
Margaritana. *Id.* „
Amblema. *Rafinesque*, 1819.
Elliptio. *Id.* „
Eurynia. *Id.* „
Obovaria. *Id.* „
Plagiola. *Id.* „
Pleurobema. *Id.* „
Proptera. *Id.* „
Truncilla. *Id.* „
Aximedia. *Id.* 1820.
Diplasma. *Id.* „
Ellipsaria. *Id.* „
Lampsilis. *Id.* „
Leptodea. *Id.* „
Metaptera. *Id.* „
Obliquaria. *Id.* „
Quadrula. *Id.* „
Rotundaria. *Id.* „
Scalenaria. *Id.* „
Syntoxia. *Rafinesque*, 1820.
Alasmodonta. *Say*, 1820.
Mysca. *Turton*, 1822.
Diplodon. *Spix*, 1827.
Tetraplodon. *Id.* „
Lasmigona? *Rafin.*, 1831.
Lasmonos? *Id.* „
Monocondylæa. *D'Orb.*, 1835.
Æglia. *Swainson*, 1840.
Canthyria. *Id.* „
Calceola. *Id.* (not *Lam.*), 1840.
Complanaria. *Id.* 1840.
Cunicula. *Id.* „
Hemiodon. *Id.* „
Hyridella. *Id.* „
Iridea. *Id.* „
Ligumia. *Id.* „
Lymnadea. *Id.* „
Megadomus. *Id.* „
Naia. *Id.* „
Naidea. *Id.* „
Potamida. *Id.* „
Theliderma. *Id.* „
Uniopsis. *Id.* „
Luticola. *Goldfuss*, 1846.

Generic Character. Shell equivalve, inequilateral, generally thick and externally smooth, occasionally ornamented with nodules or spines. In the recent state covered with an epidermis, often wanting at the umbones, where the shell is sometimes much eroded. Hinge, with two cardinal teeth in the left valve, and one, sometimes two, in the right, an elongated lateral tooth on the posterior side. Impressions by the adductor muscles large and deep, that by the mantle without a sinus. Ligament external. Shell nacreous.

Animal of the form of the shell, its mantle open in front, with simple edges or slightly fringed; siphonal tubes short, plain or fringed, sometimes scarcely defined; foot large, compressed.

This is pre-eminently a fresh-water genus, and although found living in the rivers of Europe, Asia, and Africa, appears to be only fully developed in the lakes and rivers of North America, more than 200 species have been named and described from that part of the world.

* In compliance with the recommendation of the Committee appointed by the British Association for the Advancement of Science, 1842, "to consider the rules by which the Nomenclature of Zoology may be established on a uniform and permanent basis,"—the 12th edition of Linnæus's 'Systema Naturæ,' 1767, is made the starting point from which the dates of priority have been adopted.

The difference between this genus and that of *Anodonta* is in the absence of teeth in the latter, as the name implies; but the modification of the hinge as well as the outward form of the shell in the whole group is so exceedingly variable, some being perfectly orbicular, while others are elongated and cylindrical, as to have caused it to be divided into numerous Genera, but these divisions appear to be founded upon characters alike unstable and insignificant.

As fossil, this genus is said to date its existence from the Coal Measures; it is found in the Wealden, and in the Fresh-water Deposits of the Older as well as the Newer Tertiaries, and wherever met with, the species are seldom numerous, but the individuals are usually very abundant.

1. UNIO LITTORALIS, *Lamarck*. Tab. XI, fig. 12, *a—b*.

UNIO LITTORALIS. *Lam.* Syst. des An. sans Vert., p. 114, 1801.
— — *Id.* Hist. des An. Sans. Vert., t. vi, p. 66, 1815.
— — *Drap.* Hist. Nat. des Moll. Ter. et Fluv. de France, p. 133, No. 3, pl. 10, fig. 20, 1805.
— — *Brard.* Hist. Coq. des Env. de Par., p. 222, pl. 8, fig. 6, 1815.
— — *Pfeiffer.* Land and Sussw. Moll., p. 117, pl. 5, fig. 12, 1821.
— — *Phil.* En. Moll. Sic., vol. i, p. 66, and vol. ii, p. 48.
— — Mag. Nat. Hist., New Ser., vol. ii, p. 548, fig. 27, 1838.
— — *Lyell,* Elem. of Geol., 2d ed., vol. i, p. 62, fig. 29, 1841.
— — *G. B. Sow., Jr.* Conch. Man., fig. 145, 1842.
— — *Rossmas.* Icon. der Land and Sussw. Moll., No. xi, p. 14, t. lv, figs. 473, 744, and No. xii, p. 27, t. lvi, figs. 752—754, 1844.
— — *Dupuy.* Ess. sur les Coq. Viv. et Foss. Dep. du Gers., p. 86.
— PIANENSIS. *Farines.* } fide *Rössmasler.*
— SUBTETRAGONUS. *Mich.* }
— NANA. *Desh.* 2d ed. Lam., t. vi, p. 539, No. 17, 1835.
— ANTIQUIOR. *Strickland.* Silur. Syst., p. 555, 1839.
— INCURVUS. *Lea.* Obs. Gen. UNIO, vol. i, p. 107, pl. 13, fig. 27, 1832.
— GRANOSUS. *Schum.*, fide *Lea.*
MYA RHOMBOIDEA. *Schröter.* Ausland. and Flussch., t. 2, figs. 2, 3, 1783.
Ency. Meth., pl. 248, fig. 2.

Spec. Char. Testâ ovato-oblongâ, crassâ, valdè inæquilaterâ, anticè rotundatâ, posticè subquadratâ, compressiusculâ; umbonibus prominulis, flexuosis, undulatis; dente antico cardinis dextri crasso, triangulari.

Shell ovato-oblong, thick, very inequilateral; anterior side rounded, posterior subquadrate, slightly compressed; umbones with undulating rugosities; anterior cardinal tooth in the right valve thick and triangular.

Length, 2½ inches. *Height*, 1¾ inch.

Locality. Cropthorn (*Strickland*), Clacton, Grays (*Morris*), Ilford (*Morris*).
Recent, France, Sicily.

Exceedingly abundant in the Fluviatile Deposit at Clacton.

It may be further described as being furnished with two cardinal teeth in the left valve, the anterior one is somewhat thin, sharp, and angular, sloping towards the muscle mark on that side, the other one on the posterior side of the umbo is thick, strong, and rugose, with a sharp, linear, lateral tooth, nearly parallel to the dorsal margin, or ligamental fulcrum: the right valve has one large cardinal tooth divided in the middle, this fits into a depression in the left valve of a corresponding form, and parallel to the margin is an elongated, sharp, and elevated, lateral tooth; the muscle marks are deeply impressed, more especially the anterior one, this is rugose and subquadrangular, and is bipartite or has a smaller one adjoining, more within the shell; the posterior one, placed at the extreme edge of the ligament, is slightly ovate, with the mantle mark parallel to the margin of the shell, connecting the adductors; the posterior is obtusely angular, and the shell on that side is somewhat compressed or less tumid than at the anterior: the surface of the shell is roughened by irregular and prominent lines of growth; on many of the individuals there are the remains of the epidermis, and in most instances the specimens have the ligament entire, with the valves in their natural position.

Several valves in my Cabinet have specimens of *Balanus* adhering to them, showing the proximity of the Sea at one time to this Deposit, or perhaps the re-occupation by salt-water of the locality once filled with fresh-water and its inhabitants.

This species has now an extensive Geographical range, being found in the North of France, and in the fresh-waters of the Island of Sicily; and Lea, in his 'Observations on the Genus Unio,' vol. i, p. 201, says "the shell found in the Euphrates, near Bagdad, is only a variety of this species," and he records it also as the opinion of the Baron de Ferussac. I have never seen this shell.

2. Unio tumidus, *Retzius*. Tab. XI, fig. 13.

Unio tumidus. *Retz.* Nova. Gen. Test., p. 17, 1788.
— — *Pfeiff.* Land und Sussw. Moll., pt. ii, p. 34, pl. 7, figs. 2, 3, and pl. 8, figs. 1, 2.
— — *Rossm.* Icon. Land und Sussw. Moll., pt. i, p. 117, pl. 8, fig. 70; pt. iii, p. 27, pl. 14, figs. 262—4; pl. 40, fig. 542; pl. 60, figs. 772—778.
— — *Gray.* Man. Land and F. W. Shells, p. 297, pl. 2, fig. 13, 1844.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 140, pl. 40, fig. 1, 1849.
Mya ovalis. *Mont.* Test. Brit., p. 34, 1803.
— depressa. *Don.* Brit. Shells, vol. iii, t. 101, 1802.
— ovata. *Don.* Brit. Shells, vol. iv, t. 122, 1803.
Mysca ovata. *Turt.* Brit. Biv., p. 246, 1822.
— — *Swains.* Malac., p. 277, fig. 56, 1840.
— solida. *Turt.* Brit. Biv., p. 246, pl. 16, fig. 2, 1822.
Unio pictorum. *Brown.* Illust. Brit. Conch., pl. 26, fig. 2, 1827.
— ovalis. *Sowerby.* Genera of Shells, No. 16, Unio, fig. 1.
— — *Brown.* Illust. Brit. Conch., 2d ed., pl. 31, figs. 1—4.
— rostrata? *Desh.* 2d ed. Lam., p. 540, t. vi, 1835.

Spec. Char. Testâ ovatâ, transversâ, elongatâ, crassâ, valdè inæquilaterâ; anticè rotundatâ, posticè productâ, cuneatâ, subrostratâ; umbonibus rugosis.

Shell ovate, transversely elongate, thick, very inequilateral; anterior side rounded, posterior produced, somewhat pointed, and obtusely angulated or wedge-shaped; umbones rugose.

Length, 3½ inches.

Locality. Stutton, Grays. Recent, Britain, France, and Germany.

This species is very abundant at Grays, where specimens have been obtained in great perfection, and although by no means rare at Stutton, they are in a very decorticated condition. Both these localities present us with forms deviating considerably from what are generally met with in the living state, more especially those from the latter locality, where they attain a magnitude of nearly four inches in length, and appear to have a greater proportion of the shell on the anterior side of the umbo, while in those from Grays, which are smaller, that side is shorter and proportionally broader than in the living specimens; in the Grays fossil the posterior side is obtusely pointed, and the whole shell is more angular, while the Stutton specimens are rather less so than the general or common form of the recent shell; as these extremes of variation can readily be connected through the living species, it is presumed that the differences are wholly insufficient for specific separation, and I have no hesitation in assigning the fossils of both localities as identities of the existing British species; the dental characters are also similar, the anterior tooth of the right valve being coarsely crenated on the upper or dorsal side, and somewhat compressed; the elongated lamina on the posterior side is linear, sharp, and nearly smooth.

It was at first thought, that as the Land and Fresh-water shells found in the newer Tertiaries of this country are *all* assumed to be the Homogenitors of existing animals, a name alone with reference to a work in which they have been described would have been sufficient for Geological purposes; but upon more minute examination many of them have been found to present characters deviating in so great a degree, that their identity has by some Conchologists been called in question; it is therefore now considered desirable that a figure and description of a part of them at least should be given, more especially as they have never yet appeared in any publication as British Fossils.

3. Unio pictorum. *Linnæus.*

Mya pictorum. *Linn.* Syst. Nat., ed. 12, No. 28, p. 1112, 1767.
— — *Poli.* Test. Sicil., vol. i, p. 2, t. 9, figs. 6, 7, 1791.
Unio pictorum. *Drap.* Moll. Tert. et Fluv. de Fr., pl. 11, fig. 4, 1805.
— — *Gray.* Man. Land and F.-W. Shells, p. 295, pl. 2, fig. 11, 1844.
— — *Rossm.* Icon. Land und Sussw. Moll., figs. 71, 196; pl. 29, fig. 409; pl. 58, figs. 762—766, 1844.
— — *Forb.* and *Hanl.* Hist. Brit. Shells., vol. ii, p. 142, pl. 39, fig. 1, and pl. Q, fig. 2 (Animal), 1849.

Mysca pictorum. *Turt.* Brit. Biv., p. 245, 1822.
— Deshayesii. *Brown.* Illust. Brit. Conch., p. 81, pl. 32, figs. 1—4.
— — *Rossm.* Icon. Land und Sussw. Moll., p. 23, pl. 13, fig. 197.
— longirostris. *Ziegl.* in Rossm. Iconog., pt. 3, p. 26, pl. 14, fig. 200, and pt. 12, pl. 54, fig. 38.
Ency. Meth., t. 248, fig. 4.

Spec. Char. Testâ transversâ, elongatâ, subovatâ, inæquilaterâ, anticè rotundata, posticè, angulatâ, vix rostrata; margine dorsali et ventrali subrectâ.

Shell transversely ovate, elongate, inequilateral; anterior side rounded, posterior angulated, scarcely rostrated; dorsal and ventral margins nearly straight.

Length, 2 inches.

Locality. Grays, Cropthorn. Recent, Britain, France.

This shell appears very rare as a British fossil; one specimen in the cabinet of Mr. Pickering is of a form that may be determined without much hesitation as belonging to this species, and resembles rather the thinner variety of the recent shell. The principal or perhaps only difference observable between this and the preceding species in the fossil state, is a more elongated dorsal area, less sloping on the posterior side, so that the ventral margin is more parallel with the upper edge than in *U. tumidus*. A specimen in the British Museum, from the same locality, seems to possess the like determinable characters, and one in the Museum of the Geological Society, presented by Mr. Strickland as from Cropthorn appears to be of this species. These specimens are all that I have seen, they mostly resemble fig. 766, *Rossmasler*.

Anodonta, *Cuvier*, 1798.

Musculus (sp.). *Lister.*
Mytilus (sp.). *Linn.*
Limnæa and Limnæoderma (sp.). *Poli*, 1791.
Anodontites. *Brug.*, 1799.
Dipsas. *Leach*, 1814.
Appius. *Id.* MSS., fide *Gray*,
Anodon. *Oken.*, 1815.
Cristaria. *Schum.*, 1817.
Strophitus. *Rafinesque*, 1820.
Lastena. *Id.*
Symphynota (sp.). *Lea.*, 1832.
Odatelia. *Rafinesque*, 1832.
Lamproscapha. *Swains.*, 1840.
Hemiodon. *Id.*
Patularia. *Id.*

Generic Character. Shell equivalve, inequilateral, ovate, transverse, usually thin, more or less eared, and closed; smooth, and in the recent state covered with an epidermis generally eroded at the umbones. Hinge linear, edentulous, or with one elongated lamina on the posterior side. Ligament external. Impression of the mantle without a sinus.

The animal of this genus closely resembles that of the preceding one, being furnished with a large fleshy, compressed foot, and the hinder part of the mantle is ornamented with short and pointed tentacles; anal opening is large, and the margin plain.

These animals are bisexual, and the young shell is completely formed before exclusion, although differing then materially in shape from that of its parent. Their power of multiplication is said to be enormous. Mr. Lea states that he counted not less than six hundred thousand young in an adult specimen.

The shells of this genus are also exceedingly variable, more especially in the outward form; some species have the hinge area largely elevated into the form of a wing, and in consequence of these variations, as well as from differences in size of dental characters, they have also been separated into several genera.

It appears to be a modern genus, and only yet known in the fossil state from the newer Tertiaries.

1. ANODONTA CYGNEA, *Linnæus*. Tab. XI, fig. 11.

MYTILUS CYGNEUS. *Linn.* Syst. Nat., ed. 12, No. 257, 1158, 1767.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, pl. 3A, fig. 2, 1807.
— — *Poli.* Test. Sicil., vol. ii, p. 212, pl. 33, fig. 2, 1795.
— — *Sheppard.* Trans. Linn. Soc., vol. xiii, p. 84, pl. 5, fig. 3, 1822.
— ANATINUS. *Linn.* Syst. Nat., ed. 12, p. 1158.
— — *Poli.* Test. Sicil., vol. ii, p. 213, pl. 33, fig. 1, 1795.
— AVONENSIS. *Mont.* Test. Brit., p. 172, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 250, pl. 3.
— MACULA. *Sheppard.* Linn. Trans., vol. xiii, p. 88, pl. 5, fig. 6, 1822.
STAGNALIS. *Sowerby's* Brit. Miscellany, pl. 16.
— — *Brown.* Illust. Brit. Conch., pl. 27, fig. 2, 1827.
— DENTATUS. *Turt.* Conch. Dict., p. 115, 1819.
— INCRASSATUS. *Sheppard.* Linn. Trans., vol. xiii, p. 85. pl. 5, fig. 4.
ANODONTA CYGNEA. *Pfeiff.* Land und Sussw. Moll., p. 111, t. vi, fig. 4, 1821.
— ANATINA. *Id.* - - - - p. 112, t. vi, fig. 2, „
— INTERMEDIA. *Id.* - - - - p. 113, t. vi, fig. 3, „
— VENTRICOSA. *Kickx.* Moll. Brab. Aust., p. 80.
— PISCINALIS. *Nils.* Moll. Succ. Ter. et Fluv., p. 116, fide *Forb.* and *Hanl.*
— CYGNEA. *Rossm.* Icon. Land and Sussw. Moll., pp. 1, 111, t. 3, fig. 67, 1835.
ANODON PALUDOSA. *Turt.* Brit. Biv., p. 240, pl. 15, fig. 6, 1822.
SYMPHYNOTA CYGNEA. *Lea.* Obs. on the Gen. UNIO, vol. i, p. 70, 1832.

Spec. Char. Testâ oblongo-ovata, sæpe compressâ, tenui, interdum tumidâ et incrassatâ; anticè rotundatâ, posticè productâ, et angulatâ; natibus depressiusculis, rugosis.

Shell oblongo-ovate, generally compressed and thin, sometimes tumid or inflated, occasionally thick; anterior side rounded, posterior produced, and angulated; umbones rather flat, with undulating rugosities.

Length, 3½ inches. *Height*, 2 inches.

Locality. Stutton, Clacton, Grays (*Pickering*), Cropthorn, and Bacton (*Morris*).

Recent, Britain, and North of Europe.

This species is abundant in individuals both at Stutton and Clacton, the two localities of Fresh-water Deposits that I am best acquainted with, although from their great fragility specimens are very difficult to obtain in any degree of

perfection. In all probability it was equally variable in the earlier periods of its existence, as it is at the present day. The few specimens that I possess present considerable differences in outward character, from which, therefore, it is not unfair to infer, that amongst a greater number, and from different localities, we should, as in the living shell, which varies under different external conditions, also have a great variety in the fossil state.

The specimens from Stutton (generally in a decorticated condition) are very inequilateral, the anterior side being particularly short in proportion to the other, and the shell is rather less in length comparatively, but it is almost impossible to obtain a specimen at that locality without some slight degree of distortion, and its true characters are therefore difficult to determine; but there is no doubt it is the homogenitor of our old acquaintance, which in the living condition puts on such a variety of shapes. The one from Clacton is more elongate, and corresponds with a variety abundant in the Thames above Maidenhead, in Berkshire. Mr. J. E. Gray (Manual of Land and Fresh-water Shells of the British Islands) considers the many different forms found in this country, and described under distinct specific names, to be only modifications of the same species, and the authors of the 'History of British Mollusca' are of the same opinion; from what I have seen I fully acquiesce in their decision, and the fossil specimens that have come under my observation may be arranged in the same category.

As the geographical range of this species extends over the greater part of Europe, we may naturally expect to find it in the fossil state.

Cyrena, *Lamarck.* 1818.

Venus (sp.). *Chem.*
Tellina (sp.). *Gmelin.*
Cyclas (sp.). *Lam.*, 1799, 1801.
Corbicula. *Megerle*, 1811.
Cyanocyclas. *Ferussac*, 1818.
Geloina. *Gray*, 1844.
Velorita. *Id.* „

Generic Character. Shell equivalve, roundly trigonal or subovate, generally tumid or inflated, more or less inequilateral, thick and strong. Hinge with three cardinal teeth, and a large extended lateral tooth on each side, serrated or striated in some species: in the recent state covered with an epidermis: ligament external: impression of the mantle without a sinus.

The animals constituting this genus are in a recent state inhabitants of pure fresh-water, and are only known in tropical or sub-tropical rivers, where the climate is particularly mild. They are described by Malacologists as not differing essentially

from the fresh-water genus *Cyclas*, excepting in their shelly covering, which in this shell is thick and opaque, while in Cyclas it is thin and corneous or semitransparent. Lamarck placed them in his Family Conchæ fluviatiles, in consequence of a resemblance to the animals of the Veneridæ, and from possessing the lobes of the mantle prolonged into siphonal tubes, distinct and separated down to their bases.

Although in the recent state, this is a genus of pure fresh-water origin; specimens have been found in the Estuary Deposit of the Norwich or Mammaliferous Crag almost too numerous to be considered as entirely of accidental introduction.

1. CYRENA CONSOBRINA, *Caillaud.* Tab. XI, fig. 15, *a*—*c*.

CYRENA CONSOBRINA. *Cail.* Voy. en Egypt, t. 2, pl. 61, figs. 10, 11, 1823.
— — Desc. de l'Egypt Hist. Nat., t. 22, p. 193, pl. 7, fig. 7, 1, 2, 3.
— TRIGONULA. *S. Wood.* Mag. Nat. Hist., vol, vii, p. 275, fig. 45, *a*, *b*, *c*, 1834.
— — *Lyell.* Elem. Geol., 2d ed., vol. i, p. 61, fig. 26, 1841.
— GEMMELLARII. *Phil.* En. Moll. Sic., vol. i, p. 39, t. 4, fig. 3, 1836.
— — *Id.* - - - vol. ii, p. 31, 1844.
— DUCHASTELLII. *Nyst.* Bull. de la Soc. de l'Acad. Roy. de Brux., p. 113, pl. 1, figs. 1—4, 1838.

Spec. Char. Testâ rotundato-trigonulâ, subæquilaterâ, tumidâ, crassâ; lineis elevatis, concentricis, lævibus, distantibus; cardine tridentato, divergens, inter se insertis; dentibus lateralibus longissimis, perpendiculariter striatis.

Shell roundly trigonal, subequilateral, tumid, and thick; externally ornamented with smooth, concentric, sharp, and distant ridges; hinge with three cardinal diverging teeth in each valve, lateral teeth elongated and perpendicularly striated.

Locality. Mam. Crag, Bramerton, Wangford, and Bulcham (*Alexander*).
Stutton and Grays. Recent, River Nile.

This species is exceedingly abundant in the purely Fresh-water Deposit at Stutton, where the valves are commonly united, as they are in general with fresh-water species, individual specimens may be obtained by hundreds. When the shell was first described and figured in the 'Mag. Nat. Hist.,' as referred to above, it was imagined to be specifically distinct in consequence of the posterior side being somewhat angulated, in which character it differs from the general form of the recent species, now considered as identical; but among a large series of the British fossils this character disappears, and as a distinguishing mark cannot be faithfully relied upon, as the specimens from Grays do not possess it, but have both sides more rounded, and correspond in form precisely with the Nile shell; there is every reason, therefore, to believe its descendant to be now living in the rivers of Egypt, to which part of the world it appears to have retired through the once existing fresh-waters of Sicily, for I consider the shell figured by Philippi, as nothing more than a variety of this species, although he has described it as having only two cardinal teeth in each valve, while there are three perfectly distinct in our shell; the anterior one in the right valve and

the posterior in the left being the smallest, these in imperfect specimens of the fossil might have been overlooked.

The outline of our shell is roundly trigonal, the posterior side being rather more angular and larger than the other, and the diameter is generally greater in a longitudinal direction, but in others it is even higher than long; the right valve has one central, triangular, sub-bifid, cardinal tooth immediately beneath the umbo, and another on each side of it diverging at a very considerable angle; in the left valve, the three cardinal teeth correspond in form with the interstices of the right valve, two large elongated and elevated lateral teeth, occupy the whole of the dorsal portion of the shell in the left valve, and these fit into depressions of the right one so as firmly to fix the two pieces when they are closed, and on each of these lateral teeth, as also on each side of the dental furrow in the right valve, are numerous fine striæ perpendicular to these lateral ridges, and on the inside of the callus or fulcrum for the support of the ligament are the same markings; the muscular impressions are somewhat unequal in size, the posterior one being the larger and of a subquadrate form, while the anterior is more triangular, these are connected by the line of the mantle-mark which has an incipient sinus or indentation close to the posterior adductor; these marks are seldom deeply impressed and not always visible, but when seen, they do not extend beyond the extreme verge of the lateral teeth. On the ouside, the shell is ornamented with numerous, sharp, generally equidistant ridges, parallel to the margin, and in the concave spaces between them may be seen the lines of growth; a faint line is visible in perfect specimens curving from the umbo on each side, forming a sort of large corselet and lunule, of an elongated ovate form, beyond which the ridges do not extend, precisely similar to what is seen in the Ægyptian shell: in most of the specimens of the fossil, the outside is more or less decorticated, but there is very little of erosion visible in any of my specimens at the umbones, nor is the ligament ever preserved, but that is not very thick even in the recent state.

It has been thought necessary to be thus tediously particular in giving all the minutiæ of characters belonging to this species, in order to remove any doubt respecting its identity with the well-known shell now inhabiting a part of the world where climatal conditions are different from what it is supposed were those under which it existed in this country.

A few specimens of this species have been obtained by Capt. Alexander and myself from the Coralline Crag at Gedgrave, near the mouth of the Butley River, but in association with some *Helices* and other land shells, all identical with existing animals. At this locality, the Crag appears to have been denuded of its more Coralline portion, and these shells are intermixed near the present surface with the remains of the Marine Molluscs of the lower part of that Deposit.

Depending, therefore, upon this evidence alone, we can scarcely consider the Geological Age of this species to date its existence so far back as the Period of the Coralline Crag.

Cyclas.* *Bruguière*, 1792.

Sphærium. *Scopoli*, 1777.
Nux. *Humph.*, 1797.
Cornea. *Megerle*, 1811.
Corneocyclas. *Ferus.*, 1818.

Generic Character. Shell equivalve, subequilateral, more or less tumid or inflated, thin and closed, sometimes semipellucid, smooth or slightly marked by lines of growth, and in the recent state covered with an epidermis. Hinge furnished with one or two cardinal teeth, and distant lateral teeth on each side. Impressions of the adductor muscles indistinct. Palleal impression with a small sinus. Ligament external, slender.

Animal suborbicular, its mantle open in front, with plain or simple margins; siphon produced and divided at the extremity into two distinct tubes, the edges plain or without fringes: foot large, compressed, extensile, and more or less pointed.

Priority of name most properly belongs to Scopoli, but the small and corneous shells here included are so universally known by the above designation, that I do not feel disposed to make the alteration, more particularly as *Sphærium* has been since adopted in another department of Natural History as a Generic Term. Animals now determined to belong to three distinct Genera were included by Bruguière, as well as by Lamarck, under the name of *Cyclas*, and the latter author subsequently proposed to sever from them the thicker and more ponderous species, and unite them into a genus by themselves, under the name of *Cyrena*.

The shells constituting this genus are for the most part very thin, and of a corneous or semitransparent texture in the living state; their little inhabitants are possessed of considerable powers of locomotion, and move about in the water with facility by means of their large and flexible foot; they frequent pools, ditches, lakes, and sluggish streams, and when still, are generally found buried in the sand or muddy bottom of the water. They are viviparous or rather ovoviviparous, and the young are not only perfectly formed before exclusion, but are sometimes of considerable magnitude, occupying a large portion of the parent shell to the manifest inconvenience of the mother.

They are purely Fresh-water Molluscs, and the Formations in which they are found fossil, are either of Fresh-water origin or of Estuaries in close proximity into which they have been washed. Species have been figured and described as belonging to this genus from the Wealden Formation; an undoubted *Cyclas* was found by myself in the Fresh-water Deposit at Hordwell, belonging to the Older Tertiaries.

* Etym. κυκλάς, circular.

1. CYCLAS RIVICOLA, *Leach.* MSS.

TELLINA CORNEA. *Linn.* Syst. Nat., ed. 12, No. 72, p. 1120 (part), 1767.
— — Var. β. *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 59.
CARDIUM CORNEUM. *Mont.* Test. Brit., p. 86, 1803, Var.
— NUX. *Da Costa.* Brit. Conch., p. 189.
CYCLAS CORNEA. *Drap.* Moll. Terr. et Fluv. Fr., p. 128, t. 10, figs. 1—3.
— — *Brard.* Coq. Ter. et Fluv. des Env. de Par., p. 219, t. 8, figs. 2, 3.
— RIVICOLA. "*Leach*" in *Lam.* Hist. des An. s. Vert., t. v, p. 558, 1815.
— — *Turt.* Brit. Biv., p. 248, pl. 11, fig. 13, 1822.
— *Pfeiff.* Land und Sussw. Moll., p. 121, pl. 5, figs. 3—5, 1821.
— — *Sowerby.* Genera of Shells, No. 38, CYCLAS.
— — *G. Sow., Jr.* Conch. Man., fig. 111, 1842.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 111, pl. 37, figs. 1, 2.
Ency. Meth., pl. 302, fig. 5.

Spec. Char. Testâ transversâ, ovatâ, tumidulâ, crassiusculâ, subæquilaterâ, anticè et posticè convexâ; concentricè striatâ; ligamento cardinali conspicuo.

Shell transversely ovate, somewhat tumid and strong, slightly inequilateral, anterior and posterior sides rounded; finely striated concentrically; cardinal area conspicuous.

Length, 1 inch. *Height*, $\frac{5}{8}$ths.

Locality. Southend (*Warburton*), Faversham (*Trimmer*).

I have not myself met with this species as a fossil, but specimens in that state have been obtained by Messrs. Warburton and Trimmer, from Faversham and Southend. The specimens referred to are in the Museum of the Geological Society.

2. CYCLAS CORNEA, *Linnæus.* Tab. XI, fig. 2, *a—b.*

TELLINA CORNEA. *Linn.* Syst. Nat., ed. 12, No. 72, p. 1120, 1767.
— — *Chem.* Conch. Cab., t. vi, p. 136, t. 13, fig. 133, bad.
— — *Penn.* Brit. Zool., ed. 4, p. 89, pl. 49, fig. 36.
— — *Donov.* Brit. Shells, vol. iii, t. 96, 1802.
— RIVALIS. *Müll.* Verm. Hist., t. ii, p. 202.
— STAGNICOLA. *Sheppard,* Linn. Trans., vol. xiv, p. 150, 1825.
CARDIUM CORNEUM. *Mont.* Test. Brit., p. 86, 1803.
CYCLAS CORNEA. *Pfeiff.* Deutsch. Land und Sussw. Moll., p. 120, t. v, figs. 1, 2, 1821.
— — *Turt.* Brit. Biv., p. 248, pl. 11, fig. 14, 1822.
— — *Gray.* Man. Land and F.-W. Shells, p. 280, pl. 1, fig. 2, 1840.
— — *Jenyns.* Trans. Camb. Philos. Soc., p. 295, 1831.
— — *Phil.* En. Moll. Sic., vol. ii, p. 30, 1844.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 113, pl. 37, figs. 3—6, 1849.
— RIVALIS. *Drap.* Moll. Terr. et Fluv., p. 129, pl. 10, figs. 4, 5, 1805.
— — *Brard.* Coq. Terr. et Fluv. Env. de Paris, p. 222, pl. 8, figs. 4, 5, 1815.
— FLAVESCENS. *Mac Gilliv.* Moll. Aberd., p. 246, 1843, fide *Forb.* and *Hanl.*

Spec. Char. Testâ transversâ, ovatâ, inflatâ, tenui, et fragili, subinæquilaterâ; posticè majiore, subquadratâ, anticè rotundatâ, concentricè striatâ, margine ventrali leviter arcuatâ, apicibus obtusis.

Shell transverse, ovate, tumid, very thin and fragile, slightly inequilateral, posterior side the larger, and subquadrangular; anterior rounded, very finely striated concentrically; ventral margin lightly curved.

Length, $\frac{1}{2}$ an inch. *Height*, $\frac{3}{8}$ths of an inch.

Locality. Mam. Crag, Bulcham, Southwold.
Cropthorn, Grays, Clacton, Stutton, Faversham.
Recent, Britain, France, Sicily.

This species is abundant in the Fresh-water deposits of Clacton and Stutton. The principal form is nearly ovate, and some have both sides equally rounded, but occasionally the posterior is obtusely angulated, the line of hinge carrying the lateral tooth rather further backwards than ordinary, giving it on that side a somewhat square outline. The animal in the recent state has strong adductor muscles, but they have made only a very indistinct impression upon the shell; the hinge is furnished with an apparatus well adapted to assist the close security of the valves, the right one having a sharp prominent arched or diverging tooth, immediately beneath the umbo, which locks into or between two others of similar form in the left valve; the lateral teeth are prominent and at unequal distances, that on the posterior side being considerably the more distant; in the left valve there is one before and one behind the umbo, and in the right there are two on each side, between which the single one is inserted when the valves are closed. Some specimens are quite smooth, while others are distinctly marked with numerous, obtuse concentric ridges. In the young state the shell is much flatter than when full grown.

This species is common throughout Europe, extending its range from Sicily on the south to Sweden in the North.

A few specimens of this fragile shell were found by Capt. Alexander, in the Estuary portion of the Mammaliferous Crag.

Pisidium,* *Pfeiffer*. 1821.

Tellina (sp.). *Linn.*
Cardium (sp.). *Poli.*
Cyclas (sp.). *Lam.*
Pisum. *Megerle*, 1811, fide *Gray*.
Pera. *Leach*, MSS., 1819.
Euglesia. *Id.* ,, 1820.
Galileja. *Costa*, 1839, fide *Phil.*

Generic Character. Shell small, equivalve, inequilateral, subovate, more or less inflated, somewhat thin; in the recent state subpellucid, and covered with an epidermis; smooth or concentrically striated. Hinge with one or two cardinal, and

* Etym. *Pisum?*

two lateral teeth in each valve. Ligament external, situated on the shorter side. Impressions of the adductors and of the mantle indistinct.

Animal subovate, with its mantle open on the anterior side and the margins without fringes, united towards the posterior, where it forms a short and single siphon, the orifice of which is plain; foot large, tongue-shaped, and extensile.

This genus has been separated from *Cyclas* in consequence of a difference in their animal inhabitants, those of *Cyclas* having the siphon dichotomous, or divided near the end into distinct tubes, whereas in this it remains single and simple, to the extremity, and is not so long. The species as yet known are all small, and have similar habits to the preceding, frequenting ditches or pools of stagnant water, or where the stream is not very rapid, and like the allied genus they are perfectly formed in the parent animal before exclusion. They differ also in having the side on which the ligament is situated, the posterior, shorter than the anterior; in *Cyclas* it is the reverse.

It has not as yet been met with in any Deposit of an anterior date to the Newer Tertiaries.

1. PISIDIUM AMNICUM, *Müller*. Tab. XI, fig. 1, *a—b*.

TELLINA AMNICA. *Müll.* Verm. Terr. et Fluv., pt. 2, p. 205, 1774.
— — *Chem.* Conch. Cab., t. vi, p. 138, t. 13, fig. 134, 1782.
— RIVALIS. *Maton.* Trans. Linn. Soc., vol. iii, p. 44, pl. 13, figs. 37, 38.
— — *Donovan.* Brit. Shells, vol. ii, pl. 64, fig. 2, 1801.
CARDIUM AMNICUM. *Mont.* Test. Brit., p. 86, 1803.
CYCLAS PALUSTRIS. *Drap.* Moll. Ter. et Fluv., p. 131, pl. 10, figs. 15, 16, 1805.
— OBLIQUA. *Lam.* Hist. des An. s. Vert, t. v, p. 559, 1815.
— — *Brown.* Illust. Brit. Conch., pl. 17, fig. 14, 1827.
— AMNICA. *Turt.* Brit. Biv., p. 250, pl. 11, fig. 15, 1822.
— — *Id.* Land and F.-W. Shells, p. 15, pl. 1, fig. 5.
— — *Lyell.* Elem. of Geol., 2d ed., vol. i, p. 227, fig. 103, 1841.
PERA FLUVIATILIS. *Leach*, MSS., fide *Jenyns*.
PISIDIUM OBLIQUUM. *Pfeiff.* Land und Sussw. Moll., pt. 1, p. 124, pl. 5, figs. 19, 20, and pl. 1, fig. 19, 1821.
— — *Phil.* En. Moll. Sic., vol. ii, p. 31, 1844.
— AMNICUM. *Jenyns.* Trans. Camb. Phil. Soc., vol. iv, p. 309, pl. 21, fig. 2.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 133, pl. 37, figs. 8, 9, and pl. O, fig. 8, 1849.

Spec. Char. Testâ ovatâ, obliquè trigonâ, ventricosâ, sulcato-striatâ umbonibus obtusiusculis.

Shell ovate, obliquely trigonal, ventricose, striated or sulcated, umbones rather obtuse.

Length, ½ an inch.

Locality. Mam. Crag, Southwold.

Grays, Erith (*Morris*), Cropthorn (*Strickland*), Clacton, Stutton. Faversham, and Kennet Valley (*Pickering*). Recent, Britain, France, Sicily.

This is a most abundant shell at Clacton and Stutton, and is subject to a good deal of variation, both in the outline and in its exterior ornament; in all varieties the young shell is generally flatter or more compressed than when full grown; there is also a difference in the substance of the shell, some specimens are thin and tender, while others are quite thick and strong. Those which are most flat are also in general thinner, and have a greater length from the anterior to the posterior, and are longer also on the hinder side. The specimens from Grays are mostly the thicker variety, in which the posterior side is remarkably short and truncate, and the striæ on the outside are finer and more numerous: this has been called *P. sulcatum* (fig. 1, *b*), but it is, I believe, no more than a variety, as a recent acquisition of numerous specimens show every intermediate alteration to those which are much less inequilateral, and have more distant ridges upon the exterior. These fossils seem to present rather more differences than any specimens that I have seen of the recent shell, and it is, therefore, thought desirable to have the two extreme forms represented, in order more effectually to display these variations. The hinge is furnished with two cardinal teeth in each valve, one small and simple, the other large and bifid, the posterior one in the right is bifid, while in the left valve it is the anterior; there is a large prominent lateral tooth before and behind the umbo at nearly equal distances in the left valve, and two on each side in the right: this hinge line is broad with teeth of corresponding magnitude in the thick variety, and in some specimens these form with the umbo an angle of little more than 90°, whereas in others of the elongated variety that angular line will be as large as 130°. In the thick variety, the posterior side projects but very little behind the umbo, nearly the whole of the animal being on the anterior side of the shell; in other specimens, this side is two fifths as large as the other, and the shell much less inequilateral. Similar differences may be also observed in the sculpture of the exterior, they are always ornamented more or less with concentric or elevated lines of growth, but in some, these markings are numerous, rounded, and placed close together, while in others they are sharp and narrow with a considerable plain concave space between them.

It is a common shell in England, in the living state, and has a wide Geographical distribution in Europe, extending from Sicily to Sweden.

A few specimens also of this species were obtained by Capt. Alexander from the Mam. Crag.

2. PISIDIUM HENSLOWIANUM, *Sheppard.*

TELLINA HENSLOWIANA. *Shep.* Trans. Linn. Soc., vol. 14, p. 150, 1825.
CYCLAS APPENDICULATA. *Turt.* Man. Land and F.-W. Shells, pl. 1, fig. 6.
PERA APPENDICULATA. *Leach,* MSS., fide *Jenyns.*
PISIDIUM HENSLOWIANUM. *Jenyns.* Trans. Cam. Phil. Soc., vol. iv, p. 308, t. 21, figs. 6—9, 1831.
— — *Gray.* Man. Land and F.-W. Shells, p. 285, pl. 1, fig. 6.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 131, pl. 37, fig. 11, 1849.

Spec. Char. Testâ minutâ, obliquâ, sub-ovatâ, valdè inæquilaterâ, tumidâ; anticè productiore attenuatâ, vel diminuatâ; umbonibus prominulis et appendiculatis.

Shell minute, oblique, sub-ovate, very inequilateral, and generally ventricose; anterior side much the longer; umbones slightly prominent. furnished with a projecting appendage.

Length, $\frac{1}{5}$th of an inch.

Locality. Clacton, Stutton, Cropthorn (*Strickland*), Grays (*Pickering*).

Recent, Britain, Ireland, Germany.

This is an abundant shell at the localities, Clacton and Stutton, where they are often found with the valves united.

The form is somewhat variable, but in general it may be described as triangularly ovate, the posterior side being higher, that is from the umbo to the ventral margin, diminishing towards the anterior side which is narrower and rounded, it is very inequilateral and tumid, having at the umbo an appendage or projection, which is its most distinguishing character.

3. PISIDIUM PULCHELLUM, *Jenyns.*

PERA PULCHELLA. *Leach*, MSS., fide *Jenyns.*
PISIDIUM PULCHELLUM. *Jenyns.* Trans. Camb. Phil. Soc., vol. iv, p. 306, t. 21, figs. 1—5, 1831.
— — *Gray.* Man. Land and F.-W. Shells, p. 284, pl. 12, fig. 151.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 128, t. 37, figs. 12, 13, 1849.
— FONTINALE. *Brown.* Illust. Brit. Conch., 2d ed., pl. 39, fig. 23.
— — *Pfeiffer.* Land und Sussw. Moll., pt. 1, p. 125, t. v, figs. 15, 16, 1821.
— — *Phil.* En. Moll. Sic., vol. ii, p. 31, 1844.
CYCLAS FONTINALIS. *Drap.* Moll. Terr. et Fluv., p. 130, t. x, fig. 12?
GALILEJA TENEBROSA. *Da Costa.* Corresp. Zool., fide *Phil.*

Spec. Char. Testâ minutâ, oblique-cordatâ, valdè inæquilaterâ, ventricosâ, concentricè striatâ, tenui, fragili; umbonibus prominulis.

Shell small, obliquely heart-shaped, very inequilateral, ventricose, finely striated concentrically, thin and fragile; umbones slightly prominent.

Length, $\frac{1}{8}$th of an inch.

Locality. Stutton, Clacton, Grays (*Pickering*), Copford (*J. Brown*).

Recent Britain, France, Sicily.

This appears to be by no means a rare shell in any of the above localities, though it is less abundant than *Henslowianum* at the two former, and like the recent shell it is subject to much variation.

4. PISIDIUM PUSILLUM, *Turton.*

TELLINA PUSILLA. *Turt.* Conch. Dict., p. 167, 1819.
CYCLAS PUSILLA. *Turt.* Brit. Biv., p. 251, t. 11, figs. 16, 17, 1822.
— — *Id.* Land and F.-Water Shells, pl. 1, fig. 7.
— GIBBA. *Alder.* Trans. Nat. Hist. Soc., Newcastle, vol. i, p. 41.
— FONTINALIS. *Drap.* Moll. Terr. et Fluv. France, p. 130, pl. 10, fig. 8, 1805.
EUGLESIA HENSLOWIANA. *Leach,* MSS., fide *Jenyns.*
PISIDIUM PUSILLUM. *Jenyns.* Trans. Camb. Phil. Soc., vol. iv, p. 302, t. 20, figs. 4—6, 1831.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 123, t. 37, fig. 10, and pl. O, fig. 9, 1849.

Spec. Char. Testâ pusillâ, orbiculato-ovatâ, compressiusculâ, subinæquilaterâ, subtilissimè striatâ; umbonibus prominulis.

Shell small and slender, roundedly ovate, somewhat compressed, slightly inequilateral, very finely striated; umbones but little projecting.

Length, $\frac{1}{8}$th of an inch.

Locality. Clacton, Copford (*J. Brown*), Grays (*Pickering*). Recent, Britain, France.

This species is by no means abundant in my Cabinet from the former locality, while Mr. Brown has found it in large numbers, in what is, perhaps, a more Modern deposit at Copford. The principal distinction of this shell appears to be its generally greater gibbosity; it is less inequilateral than any of the other species.

We have thus, it seems, four well determined species in this genus from the purely Fresh-water Deposits of this Kingdom, while the living British *Pisidia* have been separated by British Conchologists into not less than eight or nine. I confess, not to be very well acquainted with the recent forms, but judging from a general knowledge of the variability amongst the fresh-water shells in particular, I think too much dependence has been placed upon differences, arising from locality and other external causes, and that slight variations resulting therefrom have been considered of sufficient importance for the establishment of distinct species; I am inclined to believe, all the forms existing in England might be included in four or at most five species.

In the beautiful and extensive collection of British Land and Fresh-water Molluscs, in the Cabinet of Mr. John Pickering, are numerous forms of this genus, and I have applied to that gentleman for his assistance upon the recent as well as fossil *Pisidia,* and as he has devoted many years to the examination of these animals, I conceive his opinion to be of much more value than my own; he says (in Lit.) "I am of opinion, we have not *more* than five species of *Pisidia* in this country, viz., *P. amnicum, P. Henslowianum, P. pulchellum, P. obtusale,* and *P. pusillum.* After selecting the first three species, there are many forms remaining, from which without much difficulty may be selected *pusillum* which appears a less variable species than most of the others; then follows *obtusale* the most variable of the whole, differing in almost every locality, in some comparatively large and free growing, in others small

and stunted according to the nature of the habitat, changing its form in each stage of growth from compressed and decidedly inequilateral, to very tumid and nearly equilateral, even in the same locality, yet merging so imperceptibly into each other, that they cannot be separated without dismembering what appears to me a good and natural species; and it is yet a doubt in my mind whether on a fuller investigation of the genus, '*pusillum*' can continue to rank as a species."

"These opinions have not been suggested by the sight of a few isolated and typical forms, but after a long and patient examination of several hundred specimens, collected in various localities in the counties of Berks, Cumberland, Devon, Dorset, Essex, Hants, Herts, Kent, Lancashire, Middlesex, Northumberland, Surrey, Sussex, and Yorkshire."

In the form of my fossil specimens of *pusillum*, I can see no material difference from *obtusale*, except that in the latter the shell is more tumid; but the differences between the two do not appear to me to be more evident than some of the forms are in the fossil *Cyclas cornea*, where specimens are occasionally excessively tumid, while others of the same length and height are much compressed, and the like differences are observable in specimens of *P. amnicum*. The few individuals of these last two species, that I have seen from the Mam. Crag, are of the ordinary form or intermediate between the extremes we have had figured.

Lepton,* *Turton*, 1822.

Solen (sp.). *Mont.*, 1803.
Lutraria (sp.). *Gray*, 1825.
Psammobia (sp.). *Brown*, 1827.
Erycina (sp.). *Nyst*, 1844.

Generic Character. Shell equivalve, subequilateral, ovate, or subtrigonal, thin and compressed; umbones more or less acute, not prominent; surface elegantly ornamented; margin plain; hinge composed of two diverging teeth in each valve, between which is placed the ligament wholly internal. Impression of the mantle simple or without a sinus.

The animal of this genus is said to have its mantle freely open in front with a fringe all round the margin, and capable of extending itself considerably beyond the shell; a short siphonal tube with a single aperture, and a thick foot furnished with a byssal groove; one of the filaments of its marginal fringe is longer and larger than the others.

In addition to the two recent British species, the Crag contains one quite distinct, with another doubtful one resembling what appears to be a different species in the Campinian beds of Belgium. Conrad also describes one living in the Seas of America, as well as another from the Upper Tertiaries of that country, but few specimens of either of

* Etym. Λεπτος, thin.

these have been examined carefully, and their correct specific establishment is not at present upon a firm and stable basis; and my own species are not given with any great confidence, but more to call the attention of Collectors to their probable existence.

Specimens apparently belonging to this genus have also been obtained at Barton from the London Clay or Older Tertiaries.

1. LEPTON SQUAMOSUM, *Montague*. Tab. XI, fig. 8.

SOLEN SQUAMOSUS. *Mont.* Test. Brit., p. 565, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 48, 1807.
— — *Turt.* Conch. Dict., p. 164, 1819.
— — *Dillw.* Desc. Cat. Rec. Shells, p. 70, 1817.
— — *W. Wood.* Ind. Test. p. 16, 1825.
PSAMMOBIA PUNCTURA. *Brown.* Illust. Conch. Gr. Brit., pl. 16, fig. 7, 1827.
LEPTON SQUAMOSUM. *Turt.* Brit. Biv., p. 62, pl. 6, figs. 1—3, 1822.
— — *Flem.* Brit. An. p. 429, 1828.
— — *S. Wood.* Catalogue, 1840.
— — *Thorpe.* Brit. Mar. Conch., p. 49, 1844.
— — *G. Sowerby.* Conch. Man., fig. 62, 1843.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 98, pl. 36, figs. 8, 9, and pl. O, fig. 6, 1849.
LUTRARIA SQUAMOSA. *Gray.* Ann. of Philos., 1825.
— — *Hanley.* Recent Shells, vol. i, p. 28, Supp., pl. 9, fig. 47.
LEPTON SQUAMEUX. *Chenu.* Traité Elem., p. 47, fig. 148.

Spec. Char. Testâ ovato-trigonulâ, æquilaterali, compressâ, tenui; utroque latere rotundatâ, margine ventrali leviter arcuatâ; eleganter ornatâ; dente cardinali unico, dentibus lateralibus magnis.

Shell small, triangularly ovate, equilateral, thin, compressed; rounded on both sides, ventral margin slightly arched; elegantly ornamented externally; hinge with one small central tooth and two large lateral teeth.

Length, $\frac{1}{4}$ of an inch.

Locality. Cor. Crag, Sutton. Recent, British Seas.

One specimen only of this species was found by myself in the sandy portion of the Coralline Crag, at Sutton. The interior is sufficiently perfect for comparison, but the markings upon the exterior are rubbed and obliterated, and although there is some slight difference in the outline of our shell, there is every reason to believe it belongs to the same species as that now living in the British Seas, and to which I have assigned it. The hinge area is large, furnished with a small central tooth, and a double set, as it were, of lateral teeth, the innermost of which are large, diverging at an angle of about 90°, those placed outwardly are small and close to the dorsal margin, between these are deep depressions for the reception of the lateral teeth of the opposite valve. The dorsal margin is short, not extending beyond the lateral

teeth, it then slopes to the sides which are both rounded, and the ventral margin is also slightly convex, differing thus a little in not presenting quite such a quadrate form as the recent shell; perhaps a larger number of individuals both recent and fossil would present a greater resemblance. The beautiful sculpture which ornaments the recent shell, is replaced in the fossil by a granulated surface, the effect of probably unequal erosion, and the semipellucid appearance is changed into an opaque one from the loss of its animal matter. Two ovate rather deeply impressed muscle marks are distinctly visible in my specimen, which measures barely a quarter of an inch in length, and a little less in height.

2. LEPTON DELTOIDEUM, *S. Wood.* Tab. XI, fig. 9, *a—d.*

KELLIA DELTOIDEA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ subtriangulatâ, vel deltoideâ, æquilaterali, tumidâ, politâ, fragili; utrinque rotundatâ, margine ventrali rectâ; dentibus lateralibus approximatis.

Shell triangular or deltoidal, equilateral, tumid, glossy, and fragile; anterior and posterior sides rounded with the ventral margin straight, lateral teeth approximate.

Length, $\frac{1}{2}$ an inch. *Height*, $\frac{5}{16}$ths.

Locality. Cor. Crag, Sutton, Ramsholt.
Red Crag, Sutton.

This delicate and very elegant species is not particularly scarce in the Coralline Crag, where I have procured more than a couple of dozen specimens, and notwithstanding its extreme fragility, its presence in the Red Crag is also undoubted, two specimens belonging to that Formation are in my Cabinet, where they have been for many years, but their exact locality is uncertain, as the label has been unfortunately lost. We may fairly presume it to have prolonged its existence into the Period of the latter Deposit, as such delicate shells could only under very favorable protection have survived, being washed from an Older into a Newer Formation, and I give them without hesitation as natives of the Seas of that part of the world in both Periods.

I am not acquainted with any described species to which this can with certainty be assigned. *Bornia corbuloides*, Phil., En. Moll. Sic., vol. i, p. 14, t. 1, fig. 15, somewhat resembles it in outline, but the difference as given by the description appears to present characters sufficient to keep them distinct, being recorded to have its margin crenulated on both sides, which our shell certainly has not.

Lepton fabagella, Conrad, a very indifferent figure of which is given by Dekay, in the 'Nat. Hist. of New York,' a little resembles our shell in outline, and a fossil species by Conrad, *Lepton mactroides*, from the Upper Tertiaries of America, present general or generic resemblance, but the specimens must be examined for correct determination, and I have not been able to see any of the three species above referred to: our fossil must, therefore, for the present, remain with the name originally imposed

in my Catalogue. The shell is very thin, and in the living state was no doubt nearly transparent, it has a prominent umbo, sloping towards each extremity, and is rounded there, while the ventral margin is quite straight, even inclining a little inwards in some specimens, and is deep or tumid, particularly at the upper part; the hinge is furnished with two teeth in each valve, diverging from the ligamental area, but do not extend far towards the sides, and in the left valve immediately beneath the umbo, and before the ligament, is a small cardinal tooth, but not one in the right valve; in perfect specimens the shell is beautifully glossy, and the exterior possesses a sort of irregular concentric striæ, which I imagine is not its original appearance, and that probably it was ornamented in its recent state with more elaborate sculpture.

3. LEPTON DEPRESSUM, *Nyst.* Tab. XI, fig. 6.

CYCLAS? DEPRESSA. *Nyst.* Rech. Coq. Foss. d'Anv., p. 36, pl. 5, figs. 5, 6, 1836.
ERYCINA DEPRESSA. *Nyst.* Coq. Foss. de Belg., p. 88, pl. 4, fig. 5, *a*, *a*, *b*, *c*, *e*, 1844.

Spec. Char. Testâ transversâ, ovatâ, inæquilaterali, depressâ, tenui; dente cardinali unico, dentibus lateralibus obtusis.

Shell transversely ovate, slightly inequilateral, depressed and thin; hinge with one cardinal, and two obtuse lateral teeth.

Length, $\frac{1}{4}$ of an inch.

Locality. Cor. Crag, Sutton.

A single specimen of this shell in my Cabinet seems to correspond with what M. Nyst considers, probably with better materials than I possess, to be a distinct species, and the form certainly is different from that of any other already described; and as I am not imposing a new name, it will at least serve to call the attention of Collectors to its existence for better examination.

My specimen may be thus more particularly described. One side is rather broader or deeper than the other, the longer side being the more narrow, and slightly pointed, the hinge teeth are very obtuse, perhaps not quite perfect, dorsal area truncate, with a depressed umbo: lateral teeth not very distant, two ovate muscular impressions rather deep, and a continuous line formed by the mantle. The exterior is somewhat rough and eroded, but appears as if it once had a more regular ornament. M. Nyst says of his shell: "Transversim subtilissimè irregulariterque striatâ," and that it is in Belgium also a rare species.

4. LEPTON NITIDUM, *Turton.* Tab. XI, fig. 7.

LEPTON NITIDUM. *Turt.* Brit. Biv., p. 63, 1822.
— — *Flem.* Brit. An., p. 429, 1828.
— — *S. Wood.* Catalogue, 1840.
— — *Thorpe.* Brit. Mar. Conch., p. 49, 1844.
— — *Macgill.* Moll. Aberdeen, p. 278, 1843.
KELLIA NITIDA. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 92, pl. 36, figs. 3, 4, 1849.

Spec. Char. Testâ minutâ, ovata, subinæquilaterali, compressâ, tenui, fragili; dente cardinali unico; dentibus lateralibus magnis, distantibus.

Shell small, ovate, nearly equilateral, compressed, very thin, and fragile; hinge with one cardinal tooth, and two large and distant lateral teeth.

Length, $\frac{1}{8}$th of an inch.

Locality. Cor. Crag, Sutton. Recent, British Seas.

When compiling my Catalogue, one specimen of a shell strongly resembling the description given by Turton as a distinct species of Lepton, was in my Cabinet, and I am sorry to say it is the only one I have as yet seen. As the authors of the 'Hist. of British Mollusca' confirm its existence in the recent state, and have given a good distinguishable figure, I am able with a little more confidence to describe my shell under the name originally given. My solitary specimen possesses characters more in accordance with the diagnosis of Lepton than of Kellia, as given by the proposer of the two Genera, both as regards the hinge as well as the shell. My specimen is, I suppose, the left valve having the cardinal tooth before the ligament, which is placed in a triangular fossette immediately within a slightly prominent umbo, two large lateral teeth extend to the edge of the dorsal area, and the two sides are a little unequal in size, the anterior being a trifle the larger, and the less rounded; the shell appears to have been very thin, and the impression of the muscles indistinct, while the exterior is somewhat rough and uneven, as if it had been altered by erosion.

Kellia,* *Turton*, 1822.

Amphidesma (sp.). *Lam.*, 1818.
Lasea. *Leach*, MS., 1819. *Brown*, 1827.
Erycina (sp.). *Desh.*, 1824.
Petricola (sp.). *Gray*, 1835.
Tellimya (sp.). *Brown*, 1827.
Cyladina. *Cantraine*, 1830.
Bornia. *Phil.*, 1836.
Aligena. *H. C. Lea*, 1843.
Scacchia (sp.). *Phil.*, 1844.
Myalina? *Conrad*, 1845.
Poronia. *Recluz.*, 1846.
Chironia. *Desh.*, sec. *Gray*.

Generic Character. Shell generally small and thin, equivalved, subequilateral, orbicular, spheroidal, ovate, or roundedly-oblong; tumid, or compressed; surface smooth, or covered with visible lines of growth. Hinge composed of two, sometimes only one, tooth in each valve, with a trigonal pit for the reception of the ligament, which is within the margin of the shell, though visible in some species when the valves are closed. Impressions by the adductor muscles suborbicular, often indistinct, that by the mantle without a sinus.

Animal of the form of the shell, with the edges of the mantle disconnected only in places, extending posteriorly into one short siphonal tube, and at the anterior

* Etym. Name commemorative of J. M. Kelly, Esq.

side there is a prolonged canal with an opening for the protrusion of its foot, at the base of which is a byssal gland and groove.

This genus was proposed by Dr. Turton for the reception of two small species of British shells, one of which had been previously placed in the genus *Mya*, and the other in that of *Cardium*.

The species known, belonging to this genus, are somewhat minute but elegant bivalves, which in the living state are usually found located either in rocks or seaweeds, though most of them are capable of spinning a byssus; they possess a considerable vertical range, some living near low water mark, while others inhabit the sea at the depth of 60 fathoms. They appear to have been somewhat largely developed in the Coralline Crag Period, and are invariably found free or loose in the sand, and if ever imbedded it must have been in the leaves or roots of seaweed, or in some material which by decomposition or disintegration has liberated them from their confined position. All my specimens were found in one locality, where there is a large accumulation of numerous small species. This genus has been obtained in considerable abundance from the Older Tertiaries of this country, and several species enrich the Cabinet of my friend F. E. Edwards, Esq. There has not been anything found in the secondary Formations that can with certainty be referred to this genus, although a shell in the Green-sand strongly resembles it.

One or two species from the Crag included under this generic title possess characters that will perhaps scarcely come within the range of our diagnosis. A considerable variation may be observed in their dental arrangement, some being furnished with two or more of these appendages, while others seem to be wholly deficient, an internal ligament placed in an oblique depression appears an universal character.

1. KELLIA SUBORBICULARIS, *Montague*. Tab. XII, fig. 8, *a*, *b*.

MYA SUBORBICULARIS. *Mont.* Test. Brit., pp. 39, 564, t. 26, fig. 6, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 41, 1807.
— — *Dillw.* Des. Cat. Rec. Shells, p. 55, 1817.
TELLINA SUBORBICULARIS. *Turt.* Conch. Dict., p. 179, 1819.
AMPHIDESMA PHYSOIDES. *Lam.* Hist. des An. s. Vert., t. v, p. 493, 1818, fide *G. B. Sow.*
KELLIA SUBORBICULARIS. *Turt.* Brit. Biv., p. 57, t. 11, figs. 5, 6, 1822.
— — *Flem.* Brit. An., p. 430, 1828.
— — *Macgill.* Moll. Aberd., p. 276, 1843.
— — *Thorpe.* Brit. Mar. Conch., p. 51, 1844.
— — *J. Sowerby.* Min. Conch., t. 637, fig. 1.
— — *Lovén.* Ind. Moll. Scand., p. 44, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 93, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 87, pl. 18, fig. 9, *a*, *b*, and pl. O, fig. 4, 1849.
KELLIA LACTEA? *Lovén.* Ind. Moll. Scand., p. 44, 1846.

TELLIMYA SUBORBICULARIS. *Brown.* Illust. Conch. Gr. Brit., pl. 14, figs. 14, 15, 1827.
TELLIMYA LACTEA? *Id.* - - - - pl. 14, figs. 10, 11.
— TENUIS. *Id.* - - - - pl. 14, figs. 12, 13.
— — *Smith.* Wern. Trans., vol. viii, p. 45, 1838.
BORNIA INFLATA. *Phil.* En. Moll. Sic., vol. i, p. 14, and vol. ii, p. 11.
ERYCINA PISUM. *Scacchi.* Catal., p. 6, figs. 1 and 2, 1836.

Spec. Char. Testâ tumidâ, orbiculato-oblongâ vel suborbiculari, subæquilaterali, tenui, fragili; striis tenuibus incrementi distinctis; cardine bidentato, dentibus lateralibus remotis.

Shell tumid, roundedly-oblong or suborbicular, nearly equilateral, very thin and fragile; smooth or covered with very fine lines of growth; hinge with two cardinal teeth in one valve and one in the other, lateral teeth remote.

Diameter, $\frac{1}{4}$ of an inch.

Locality. Coralline Crag, Sutton.
Red Crag, Walton Naze.
Recent, Britain, Scandinavia, and Mediterranean.

The animal of this species, which may be considered the type of the genus, has been examined by Mr. Alder, and a description published in his valuable Catalogue of the 'Mollusca of the Coast of Northumberland' (page 94), where he has pointed out a remarkable deviation from the normal form of the *Bivalvia*, which in general have the siphonal tube or tubes, when they exist, placed at the posterior side of the shell, while in this one, in addition to a short siphon in its natural position, there is a large tube capable of being projected a considerable distance on the anterior side. The mantle has three openings, he says, one posteriorly for the usual siphon which scarcely projects beyond the margin of the shell; another in front in the form of a tube, which is protruded when the animal is in a state of activity, to a distance equalling the diameter of the shell; and the third is for the emission of a long subcylindrically-formed foot, at the base of which is a small opening and gland for the production of delicate threads or filaments, whereby the animal is enabled freely to suspend itself in the water to some foreign body although it is more often found located in the aperture of a rock.

A considerable degree of variation in form may be observed among the shells of this species in the recent state, but it is more particularly so with those which are found in the crevices of rocks, which probably in some measure distort or alter the otherwise natural form of the shell. This species is not by any means common in the Coralline Crag.

The more general form of my fossils is nearly orbicular, but one specimen (fig. 8, *b*) is more transverse, or has a greater diameter from the anterior to the posterior extremity: the same differences exist in those now found in our own seas. The Red Crag at Walton Naze has furnished me with one specimen. It is said to range from low-water mark to a depth of 60 fathoms.

2. KELLIA ORBICULARIS, *S. Wood.* Tab. XII, fig. 9, *a—c.*

KELLIA? ORBICULARIS. *S. Wood.* Catalogue, 1840.
— — *J. Sowerby.* Min. Conch., t. 637, fig. 2, *a.* 1844.

Spec. Char. Testâ minutâ, orbiculari, tumidâ, obliquâ, subæquilaterali, clausâ; concentricè et rugosè striatâ; latere postico breviore; dente cardinali unico in utraque valva ante foveam ligamenti; fovea triangulari, obliquâ, profundâ.

Shell small, orbicular, or spheroidal, inflated, subequilateral, closed; roughly striated concentrically; posterior side the shorter; one cardinal tooth in each valve before the ligament; ligamental pit oblique, deep, and of a triangular form.

Diameter, $\frac{1}{4}$ of an inch.

Locality. Cor. Crag, Sutton.

This is more abundant than the preceding species, and is limited, as far as I know, to one locality. I have not been able to trace it higher up in the Series, or nearer to our own time than the Cor. Crag. A shell called *Scacchia inversa,* (*Philippi,* En. Moll. Sic., vol. ii, p. 27, T. 14, f. 10,) resembles this in some respects, but differs in others, sufficiently, it is presumed, to be considered specifically distinct, depending upon the figure and description by Philippi.

The ligament is wholly internal, and the pit for its reception is an oblique, angular depression beneath or within the dorsal margin, extending backwards to some distance, with a ridge or ledge for its support. The umbo is prominent, and there is a considerable obliquity in the shell; an obtuse kind of ridge slopes from the umbo towards the anterior ventral margin, behind this the shell is a little flattened, giving a squarish outline by a somewhat straightened ventral margin. The left valve has the larger tooth, this is situated a little in advance, and not immediately beneath the umbo; the cardinal tooth of the right valve is placed further backward, and locks in behind the larger tooth of the opposite valve, making that tooth appear in some specimens to have a ledge, or another rudimentary one. In the figure of this species in Min. Conch., the teeth are represented as of equal size, but there is an evident inequality, neither are they both in the same position, there is no vestige of a tooth on the posterior margin, in which character it differs from any of the three figures given by Brown in his 'Illustrations of British Conchology.' Conrad, in his 'American Miocene Fossils,' figures and describes a similar species under the name of *Amphidesma æquata,* p. 65, Pl. 36, f. 5, but the figure is so inferior, and the description so brief, that it is impossible to institute a fair comparison.

3. KELLIA AMBIGUA, *Nyst.* Tab. XII, fig. 11, *a, b.*

CORBULA AMBIGUA. *Nyst.* and *West.* Nouv. Rech. Coq. Foss. d'Anv., p.6, pl. 3, fig. 4, 1839.
ERYCINA AMBIGUA. *Nyst.* Coq. Foss. de Belg., p. 89, pl. 4, fig. 6, *a, b,* 1844.
— STRIATULA. *Id.* - - - - p. 90, pl. 4, fig. 7, *b, c.*
KELLIA DUBIA. *S. Wood.* Catalogue, 1840.
— — *J. Sow.* Min. Conch., t. 637, fig. 4, *a, b,* 1846.
— — *Tennant.* Strat. List. Brit. Foss., p. 15, 1847.

Spec. Char. Testâ transversâ, elongato-ovatâ, æquilaterali, leviter convexâ, lævigatâ, vel tenuissimè striatâ; utrinque rotundatâ, dente cardinali unico, obtuso; lateralibus nullis, foveâ ligamenti elongatâ obliquâ.

Shell transverse ovate, equilateral, slightly convex rounded at both extremities, smooth, or with very fine lines of growth; hinge with one cardinal tooth, no lateral teeth, ligamental area elongated, and oblique.

Length, $\frac{3}{4}$ths. *Height*, $\frac{7}{16}$ths. of an inch.

Locality. Coralline Crag, Sutton.
Red Crag, Walton Naze, and Sutton.
Mam. Crag, Chillesford.

This shell is abundant in the Coralline Crag, but the specimens are generally small, rarely exceeding half an inch. Fig. 11, *b*, is from the Red Crag, and measures at least three quarters of an inch. Among a large number of individuals a considerable variation may be observed, but these differences are principally in the proportional dimensions, although some specimens have occasionally a more triangular form (fig. 11, *a*). It is furnished with one somewhat prominent but obtuse tooth in the right valve, with a depression before it, and in the left valve there are two teeth, when perfect, which is not often the case, one immediately beneath the umbo, erect and compressed, the other decumbent along the margin and at right angles to the other; the ligamental area slopes obliquely backwards, forming a thickened ridge, against which it rested. The impressions by the adductors are large and rather elongated, while that formed by the edge of the mantle is at some distance within the margin of the shell, and is without any inflection, and in some thin specimens from the Coralline Crag, fine radiating lines are visible in the interior.

This is the largest species of Kellia that I am acquainted with, and strongly resembles in form a shell from the Paris basin, to which it was assigned in my Catalogue; but by a comparison with a specimen from the Older Tertiaries of this country, now in the cabinet of Mr. John D'Urban, and which probably is identical with the *Psammotea dubia*, Desh, a material difference is exhibited sufficient to prove them specifically distinct, as in that shell the ligament is placed on the outside, whereas in ours it is wholly internal.

A recent species from the Coast of Lower California, described and figured by Conrad in the 'Journal of the Acad. of Nat. Sci.,' Philadelphia, 1850, Art. xxii, p. 279, pl. 39, fig. 1, under the name of *Solecardia eburnea*, has a strong generic relationship with our Crag fossil, although no doubt specifically distinct.

4. KELLIA ELLIPTICA, *Scacchi*. Tab. XII, fig. 13, *a—c*.

TELLINA ELLIPTICA. *Scacchi*. Oss. Zool., ii, p. 14, 1833, } fide *Philippi*.
LORIPES ELLIPTICUS. *Scacchi*. Ejusd. Cat., p. 5, fig. 1, }
LUCINA OBLONGA. *Phil*. En. Moll. Sic., vol. i, p. 34, t. 4, fig. 1, 1836.
KELLIA FLEXUOSA. *S. Wood*. Catalogue, 1840.
— — *J. Sowerby*. Min. Conch., t. 637, fig. 5, *a*, 1844.
SCACCHIA ELLIPTICA. *Phil*. En. Moll. Sic., vol. ii, p. 27, t. 14, fig. 8, 1844.

Spec. Char. Testâ transversâ, ovatâ vel ellipticâ; valdè inæquilâterali, convexâ, lævigatâ, politâ, tenui; anticè productâ, utrinque rotundatâ; margine dorsali flexuosâ; cardine valvulâ sinistrâ bidentato; dentibus lateralibus nullis.

Shell transverse, ovate or elliptical, convex; very inequilateral, smooth, glossy, and thin; anterior portion much the larger, and rounded at both extremities; dorsal margin sinuated; hinge with two cardinal teeth in left valve; no lateral teeth.

Length, $\frac{3}{16}$ths. *Height*, $\frac{1}{8}$th of an inch.

Locality. Coralline Crag, Sutton. Recent, Mediterranean.

A large number of this pretty little shell have been obtained at the rich Depôt of Molluscan remains at Sutton, where the two valves are occasionally, though rarely, found united.

The most distinguishing mark of this species is the peculiar sinuosity of the upper margin of the shell on each side of the umbo in both valves, but that in the right one is the most conspicuous; a sinus or rather an indentation at a considerable, but about an equal distance both before and behind the umbo, received the edge of the margin of the left valve by which it is a little twisted, thus interlocking and serving the office of lateral teeth. The hinge is furnished with one obtuse tooth in the right valve with a deep depression immediately before it; in the left valve are two teeth, one of which is somewhat prominent and compressed, the other placed at right angles to it and in a line with the margin; these two, when the valves are closed, occupy a position on each side of the single tooth of the right valve. The ligamental area is small and oblique, sloping towards the posterior side; the muscular impressions are large and distinct, and the mantle mark without any inflection.

I have not been able to compare my shell with the recent Mediterranean species, but from the peculiar character of a flexuous margin there cannot be much doubt of its identity; my specimens do not appear quite so large as the one represented by Philippi.

Scacchi's name is restored upon the authority of M. Philippi.

5. KELLIA CYCLADIA, *S. Wood*. Tab. XI, fig. 4, *a*, *b*.

KELLIA CYCLADIA. *S. Wood*. Catalogue, 1840.
— — *J. Sowerby*. Min. Conch., t. 637, fig. 6, *a*, 1844.
SCACCHIA OVATA? *Phil*. En. Moll. Sic., vol. ii, p. 27, t. 14, fig. 9, 1844.

Spec. Char. Testâ transversâ, obliquâ, tumidâ, ovato-trapezoideâ, valdè inæquilaterali, tenui, fragili; margine dorsali integerrimo; anticè majore, posticè subrecto; dente cardinali unico, dentibus lateralibus nullis.

Shell transverse, oblique, tumid, of an ovate trapezoidal outline; very inequilateral, thin and fragile; dorsal margin without any inflection; anterior side the larger, posterior nearly straight; one cardinal tooth and no lateral teeth.

Length, $\frac{1}{4}$ of an inch nearly.

Locality. Coralline Crag, Sutton. Recent, Mediterranean.

Two or three specimens only of this delicate and fragile shell were all that I possessed when Mr. Sowerby figured and described it in 'Min. Conch.,' and I am sorry to say I have seen none in addition to that number. A recent shell from the Mediterranean above referred to, seems to correspond in most characters with our own, and I should imagine there was no doubt of the identity, but that the Crag shell is wholly destitute of lateral teeth, which M. Philippi describes as being distinct in his species. The hinge was probably furnished with one cardinal tooth in the right valve and two in the left, but in my specimens of both valves they are nearly obsolete. The recent shell was no doubt in a better state of preservation and more to be depended upon.

Its outward form and absence of all flexuosity in the margin will distinguish this from the preceding, which probably it resembled in its dentition. In the general form and fragile texture it much resembles one of the Freshwater Cyclades, whence its specific name.

Amphidesma equalis, Conrad, 'Amer. Mioc. Foss.,' p. 76, Pl. 43, fig. 9, in outward form is somewhat like our shell, but the figure, as with *A. æquata*, is not sufficient for comparison, and the description is too concise to supply the deficiency.

6. KELLIA COARCTATA, *S. Wood.* Tab. XII, fig. 10, *a*, *b*.

KELLIA COARCTATA. *S. Wood.* Catalogue, 1840.

GALEOMMA COMPRESSUM? *Phil.* En. Moll. Sic., vol. ii, p. 19, t. 14, fig. 5, 1844.

Spec. Char. Testâ minutâ transversâ, oblongâ, lævigatâ, politâ, compressâ, subæquilaterali; anticè majore, dente cardinali unico in utraque valvâ, lateralibus nullis; margine ventrali recto, vel coarctato.

Shell small, transverse, oblong, smooth, and glossy, compressed nearly equilateral, anterior side the larger; hinge with one cardinal tooth in each valve, lateral teeth none, ventral margin straight, or subsinuated.

Length, $\frac{7}{32}$ds. *Height*, $\frac{1}{8}$th of an inch.

Locality. Coralline Crag, Sutton.

Two or three dozen specimens of this species are in my Cabinet, all from one locality. The form of the shell is somewhat oblong, rounded at the corners; the posterior side is not only the shorter, but is rather narrower; the dorsal margin of the anterior side being nearly straight, while the posterior has a gentle slope by which that side is a little diminished. The exterior in perfect specimens has a beautiful glossy appearance, and it was probably in the living state a semitransparent shell. There is one tooth in each valve, that in the right is the larger and more prominent, behind this is the ligament, placed on an oblong kind of shelf, inclining inwards on the posterior side, the edge of this shelf is in some individuals slightly elevated above the margin, and might be mistaken for another tooth; the lines of growth are occasionally visible but no regular striæ, and the impressions of the muscles are not distinguishable.

In dental characters and position of the ligament it corresponds with some of the other species included in this genus, and appears to be more closely allied to it, than to *Galeomma* in which Philippi has placed his shell, which is considered here with doubt as an identity.

One specimen of mine has the two valves united, but does not show an opening at the ventral margin, a character essential to that genus; there is a twist in the shell, and the single valve, when laid with its margin downwards, will not touch on all sides, and this bend in the opposite valve is in the contrary direction, so as to bring the margins of the two pieces together at all parts when the valves are closed; nevertheless there is something about it peculiar to itself as possibly not to belong to either this or to *Galeomma*.

7. KELLIA PUMILA, *S. Wood.* Tab. XII, fig. 15, *a*, *b*.

MONTACUTA PUMILA. *S. Wood.* Catalogue, 1840.
KELLIA PUMILA. *J. Sowerby.* Min. Conch., t. 637, fig. 3, 1846.

Testâ minimâ transversâ, ovatâ, obliquâ, tumidâ, valdè inæquilaterali, lævigatâ, politâ; anticè majiore et longiore, utrinque rotundatâ; dente cardinali unico, dentibus lateralibus magnis.

Shell small, transverse, ovate, oblique, tumid, very inequilateral, smooth, and glossy; anterior side much the larger and longer, both sides rounded; hinge with one cardinal tooth, and two lateral teeth.

Diameter, $\frac{1}{10}$th of an inch.

Locality. Cor. Crag, Sutton.

This is a very abundant shell at the above locality, where the two valves are often found united, their large and prominent teeth having kept them in their natural position.

Without allowing a latitude in variation beyond what we are accustomed to do, even with such variable species as were the inhabitants of the Crag Seas, this shell can scarcely be admitted as an identity with the *K. rubra*, although it bears a close approximation; and as the Malacologists have placed the recent shell in *Kellia*, it is thought best to follow their example, although it does not strictly accord in its dental characters with the diagnosis of that Genus.

Our shell is more inequilateral than *K. rubra*, and the hinge is quite at the side, the umbo being almost terminal, and the posterior lateral tooth then forms nearly a right angle with the beak and anterior lateral tooth: in the recent shell the hinge is much more central, with less of gloss upon the exterior; ours was perhaps a more transparent shell, with the teeth rather less distinct: thus differing more from the Mediterranean shell, according to Messrs. Forbes and Hanley, than from the British; there are two prominent lateral teeth, with a central one in the right valve, and two smaller nearly obsolete lateral teeth in the left valve.

Turton, in his 'British Bivalves,' p. 258, states the animal of this species to be viviparous, and that he found many specimens filled with perfectly formed young ones, similar in habit to the Genus *Cyclas*.

8. KELLIA RUBRA, *Montague*. Tab. XI, fig. 10.

CARDIUM RUBRUM. *Mont*. Test. Brit., p. 83, t. 27, fig. 4, 1803.
— — *Mat*. and *Rack*. Linn. Trans., vol. viii, p. 66.
— — *W. Wood*. Ind. Test., p. 24, 1825.
TELLINA RUBRA. *Turt*. Conch. Dict., p. 168.
KELLIA RUBRA. *Turt*. Brit. Biv., pp. 57 & 258, pl. 11, figs. 7, 8, 1822.
— — *Flem*. Brit. An., p. 430, 1828.
— — *Gould*. Inv. Massach., p. 60, 1841.
— — *Thorpe*. Brit. Mar. Conch., p. 51, 1844.
— — *Alder*. Cat. Moll. North. and Durh., p. 94, 1848.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. ii, p. 94, pl. 36, figs. 5—7, and pl. O, fig. 3, 1849.
LASÆA RUBRA. *Brown*. Illust. Conch. Gr. Brit., pl. 20, figs. 18, 19, 1827.
BORNIA SEMINULUM. *Phil*. En. Moll. Sic., vol. i, p. 14, pl. 1, fig. 16.
— — *Desh*. Exped. Scient. Algerie. Moll., pl. 43, figs. 8—11, and pl. 43 A, figs. 6, 8.
PORONIA RUBRA. *Recluz*. Rev. Cuv. Zool., p. 175, 1843.
— — *Hanley* in Brit. Mar. Conch. Syst. Ind., p. xxv, 1844.

Spec. Char. Testâ minutâ, ovatâ, tumidâ, subinæquilateráli lævigatâ, utrinque rotundatâ, umbonibus prominulis.

Shell small, ovate, tumid, slightly inequilateral, smooth; both sides rounded, umbones rather prominent.

Diameter, $\frac{1}{10}$th of an inch.

Locality. Coralline Crag, Sutton.

Recent, Mediteranean, Britain, North America.

A single slightly injured specimen from the rich Depôt of small shells in the Coralline Crag at Sutton is all that I have been able to obtain; it seems to have the essential characters of the recent species, to which it is here referred, and as such is introduced as an identity, although a few more and better specimens would be desirable for confirmation: the character in which the preceding species seems most to differ from the recent shell, and upon which its specific separation was founded, is its being more inequilateral, and among all my numerous specimens there may be observed a very general uniformity in that respect. The specimen now under notice has the hinge more in the centre, placed as in the recent shell, the two lateral teeth forming a very obtuse angle with the umbo; they appear rather less in size than those of the British specimens, and these are said to be less developed than in the Mediterranean shell.

This is said by Mr. Clark (Mag. Nat. Hist., 1849,) to be the most terrestial of Bivalves, its habitat being generally in *Lichina pygmæa*, and that often from ten to twenty feet above the level of the highest spring-tides.

Montacuta. *Turton*, 1822.

Ligula (sp.). *Mont.*, 1808.
Petricola (sp.). *Gray*, 1825.
Erycina (sp.). *Desh.*, 1825 : (sp.) *Nyst*, 1844.
Mesodesma (sp.). *Lovén*, 1846.

Generic Character. Shell equivalve, inequilateral, transversely oblong, or obliquely ovate, generally small and thin: surface smooth, or concentrically striated, and occasionally with a few radiating ridges. Hinge with two diverging elongated teeth, more conspicuous in one valve than in the other. Ligament internal, placed in a triangular fossette: impression by the mantle without a sinus.

Animal oblong, having its mantle open in front, margins not fringed; without siphonal tubes (?); foot large and broad, furnished with a byssal groove.

The name of this Genus was proposed in honour of Montague, the author of 'Testacea Britannica;' it is not, however, well determined, as two or three species, the animals of which have undergone a careful examination, so far as their diminutive forms will permit, seem to present considerable differences, and as far as regards the shells alone, or their dental characters, the species here included would probably justify their being separated into different Genera. As the authors of the 'Hist. of Brit. Mollusca' have made the same observation, and have not ventured to propose a new Genus where the animals present characters so materially different, it would ill become the Palæontologist with only the shells to guide him, to venture upon such a step.

Shells apparently of this Genus, at least such as present similar dental characters, have been obtained from the Older Tertiaries of this country by Mr. Edwards; but nothing as yet known have been found in any Deposit of a more ancient date. Its Geographical range is at present limited to the European Seas and the Western Coast of America.

1. Montacuta bidentata, *Montague*. Tab. XII, fig. 17, *a*, *b*.

Mya bidentata. *Mont.* Test. Brit., p. 44, t. 26, fig. 5, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 41, 1807.
— — *Turt.* Conch. Dict., p. 102, 1819.
Montacuta bidentata. *Turt.* Brit. Biv., p. 60, 1822.
— — *Gould.* Inv. Massach., p. 59, 1841.
— — *Macgill.* Moll. Aberd., p. 302, 1843.
— — *Thorpe.* Brit. Mar. Conch., p. 52, fig. 58, 1844.
— — *Alder.* Cat. Moll. North. and Durh., p. 95, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 75, pl. 18, figs 6, 6*a*, 1849.
Anatina bidentata. *Brown.* Illust. Brit. Conch., pl. 11, figs. 8, 9, 1827.

TELLIMYA BIDENTATA. *Brown.* Ilust. Brit. Conch., 2d ed, p. 107, pl. 44, figs. 8, 9.
PETRICOLA — *Gray.* Ann. of Philos., 1825.
— — *Hanley.* Recent Shells, p. 54.
ERYCINA — *Recluz.* Rev. Zool., p. 331, 1844.
— FABA. *Nyst.* Coq. Foss. de Belg., p. 90, pl. 4, fig. 8, *a—d*, 1844.
MESODESMA EXIGUUM. *Lovén.* Ind. Moll. Scand., p. 42, 1846.

Spec. Char. Testâ minutâ, oblongo-ovatâ, inæquilaterali, lævigata, tenui; posticè abbreviatâ, obtusè angulatâ, anticè productâ, rotundatâ, vix attenuatâ, margine ventrali et dorsali leviter arcuatis; dentibus duobus in utraque valvâ; fovea ligamenti media subumbone demissa.

Shell small, oblong or ovate, inequilateral, smooth, thin; posterior side short, obtusely angulated, anterior produced and rounded, scarcely contracted; dorsal and ventral margins slightly curved; two teeth in each valve; a moderate sized cavity for the ligament deeply situated beneath the umbo.

Length, $\frac{5}{16}$ths of an inch. *Height*, $\frac{2}{3}$ds the length.

Locality. Cor. Crag, Sutton and Gedgrave.
Red Crag, Walton Naze.
Recent, Britain, Scandinavia, and North America.

Specimens of this species are by no means rare in the Coralline Crag, and I have found a few in the genuine Deposit of the Red Crag, at Walton Naze. Those from the latter or newer Formation correspond precisely with the recent shell from our own seas, and do not exceed it in size. The posterior side is considerably the shorter of the two, extending about one quarter the distance from the umbo that it does on the other side: the shell is smooth or very nearly so, and moderately tumid, the anterior or larger side forms half an ellipse, and the teeth are large and very distinct in the right valve, the one on the anterior side being the longer; those in the left valve are merely an angular elevation of the edge of the margin and inserted, when the valves are closed, into the depression between the teeth and margin of the right or opposite valve. The muscles are stated by M. Lovén to be large and powerful, but the impressions left by them in my specimens are very ill-defined, and by no means deeply seated.

In the recent state as a British species it is not very abundant, and is said by British Conchologists to be generally found burrowing in very thick valves of dead Oysters. I have never seen the fossil in such a situation.

2. MONTACUTA TRUNCATA, *S. Wood.* Tab. XII, fig. 16, *a*, *b*.
MONTACUTA TRUNCATA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ valdè inæquilaterali, cuneiformi vel subrhomboideâ, compressâ, concentricè striatâ; posticè brevissimâ, angulatâ, anticè productâ, rotundatâ, attenuatâ; margine ventrali et dorsali rectiusculis; dentibus duobus divergentibus, in valvâ dextrâ majoribus, foveâ ligamenti parvâ.

Shell very inequilateral, subrhomboidal or slightly wedge-shaped, compressed or flattened, covered with concentric striæ; posterior side very short, angulated, anterior produced, slightly contracted, and rounded; ventral and dorsal margins nearly straight; two diverging teeth in each valve, much the larger in the right; a small triangular ligamental cavity placed immediately beneath the umbo.

Length, $\frac{3}{8}$ths. *Height*, $\frac{1}{4}$ of an inch.

Locality. Cor. Crag, Sutton.

This species is by no means scarce at Sutton, although valves of the above dimensions are not very often met with.

There are differences in this shell that seem to justify a removal from the preceding, although it must be confessed it is very nearly related, and in the immature state it is exceedingly difficult, if not impossible, to separate them, but what are considered to be the distinctive characters may be pointed out leaving to future observation to confirm or refute their identity.

In the recent species (*bidentata*), the shell is not only less in size but more tumid, and nearly smooth, our fossil is compressed, and the body of the shell much flattened, the posterior side is particularly short and truncate, sloping direct from the umbo. On the anterior side, which constitutes nine tenths of the shell, the dorsal and ventral margins are nearly straight but not quite parallel, the termination rounded and narrower, giving a somewhat cuneiform shape to the shell; the exterior is covered with regular and large concentric striæ or lines of growth, and the ventral portion of the shell is slightly compressed, with an imperfect angular ridge on the shorter side: the right valve has two large diverging teeth, the posterior one being the smaller; between these and immediately beneath the umbo is a small triangular cavity for the ligament. In the left valve, the margin is elevated into angular denticles which are inserted, when the valves are closed, between the margin and the teeth of the opposite valve. Muscular impressions not very distinct.

3. MONTACUTA SUBSTRIATA, *Montague*. Tab. XII, fig. 12, *a*, *b*.

LIGULA SUBSTRIATA. *Mont.* Test. Brit. Sup., p. 25, 1808.
MYA SUBSTRIATA. *Dillw.* Desc. Cat. Rec. Shells, p. 47, 1817.
— — *Turt.* Conch. Dict., p. 103, 1819.
— — *W. Wood.* Ind. Test., p. 11, No. 22, 1825.
MONTACUTA SUBSTRIATA. *Turt.* Brit. Biv., p. 59, t. 11, figs. 9, 10, 1822.
— — *Flem.* Brit. An., p. 465, 1828.
— — *S. Wood*, Catalogue, 1840.
— — *Macgill.* Moll. Aberd., p. 303, 1843.
— — *Lovén.* Ind. Moll. Scand., p. 43, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 96, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 77, pl. 18, figs. 8, 8*a*, and pl. O, fig. 2, 1849.
TELLIMYA — *Brown.* Illust. Brit. Conch., pl. 16, fig. 23, 1827.
ERYCINA — *Recluz.* Rev. Zool., p. 330, 1844.
SPHÆNIA COSTULATA. *Macgill.* Moll. Aberd., p. 301, 1843, fide *Forb.* and *Hanl.*

Spec. Char. Testâ minutâ, transversâ, obliquâ, ovatâ, valdè inæquilaterali, convexâ, politâ, tenui, fragili; anticè productâ, utrinque rotundatâ; costatâ, costis acutis paucis; natibus prominulis; dente cardinali unico.

Shell small, transverse, oblique, ovate, very inequilateral, convex, glossy, thin and fragile; anterior much the larger, both sides rounded; ornamented with a few small sharp radiating ribs; umbones rather prominent; hinge with one tooth.

Length, $\frac{3}{16}$ths. *Height*, $\frac{1}{8}$th of an inch.

Locality. Cor. Crag, Sutton. Recent, Scandinavia and Britain.

This shell is by no means rare at the above locality. I have not yet seen it as a fossil in any Formation of a more recent date. It appears to resemble in every respect the living species, except perhaps it is a little larger. In order to institute a fair comparison it may be thus more fully described. The posterior side is very short and rounded, the anterior dorsal margin nearly straight, with a sharp and somewhat prominent umbo. The shell is glossy externally, covered with radiating distant striæ, or rather small angular ridges, which extend all over the shell, but are most prominent and conspicuous about the centre, and are more numerous on the older than on the younger part of the shell, that is, they do not all terminate, or rather, originate at the beaks; an intermediate ray is occasionally introduced on the body of the shell, but on the anterior slope ten or a dozen of these ridges are interposed between two which proceed direct from the umbo: hinge with a tooth in the right valve, placed in the direction of the dorsal margin anteriorly, having a depression on the upper side of it, and a similarly formed tooth, with a corresponding cavity in the opposite valve; ligamental pit moderately large, sloping obliquely beneath the posterior dorsal margin. In most of my specimens a slight depression is visible on the exterior, formed by the contraction of the ventral margin, probably the result of a protruded byssus.

It is considered in the recent state a deep-water animal, ranging from 10 to 140 Fathoms.

4. MONTACUTA FERRUGINOSA, *Montague*. Tab. XII, fig. 14, *a*, *b*.

MYA FERRUGINOSA.	*Mont.*	Test. Brit., Sup., pp. 22 & 166, t. 26, fig. 2, 1808.
MONTACUTA FERRUGINOSA.	*Turt.*	Brit. Biv., p. 60, 1822.
—	*Alder.*	Cat. Moll. North. and Durh., p. 96, 1848.
—	*Forb.* and *Hanl.*	Hist. Brit. Moll., vol. ii, p. 72, pl. 18, figs. 5, 5*a*, 5*b*, 1849.
—	*Alder.*	Ann. and Mag. Nat. Hist., 2d Series, vol. v, p. 210, pl. 6, B, 1850.
— OBLONGA.	*Turt.*	Brit. Biv., p. 61, t. 11, figs. 11, 12, 1822.
— —	*Flem.*	Brit. An., p. 465, 1828.
— —	*Thorpe.*	Brit. Mar. Conch., p. 52, 1844.
— —	*Macgill.*	Moll. Aberd., p. 302, 1843.
— GLABRA.	*Macgill.*	Moll. Aberd., p. 303, 1843.
— —	*Thorpe.*	Brit. Mar. Conch., p. 245, 1844.

MONTACUTA FERRUGINEA. *Thorpe.* Brit. Mar. Conch., p. 52, fig. 16, 1844.
— OVATA. *S. Wood.* Catalogue, 1840.
— TENELLA? *Lovén.* Ind. Moll. Scand., p. 43, 1846.
TELLIMYA OVATA. *Brown.* Illust. Brit. Conch., pl. 14, figs. 20, 21, 1827.
— ELLIPTICA. *Id.* - - - pl. 14, figs. 17, 18, „
— GLABRA. *Id.* - - - 2d ed., p. 107, pl. 42, figs. 20, 21.
— OVATA. *Smith.* Mem. Wern. Soc., vol. viii, p. 41, 1838.
ERYCINA FERRUGINOSA. *Recluz.* Rev. Zool. Cuv., p. 332, 1844.

Spec. Char. Testâ transversâ, ellipticâ, convexâ, tenui, lævigatâ vel concentricè striatâ; anticè longiore, posticè subattenuatâ; margine dorsali et ventrali leviter arcuatis.

Shell transverse, elliptical, convex, thin, smooth, or striated concentrically, anterior side the longer, posterior slightly attenuated, dorsal and ventral margins gently curved.

Length, $\frac{1}{2}$ an inch. *Height*, $\frac{1}{4}$ of an inch.

Locality. Cor. Crag, Sutton. Recent, Britain and Scandinavia.

This is not an abundant shell in my Cabinet, a few specimens however are sufficiently perfect to be fairly compared with the recent British shell, and I believe the differences are not more than may be considered as local variations.

Our shell is very transverse, having a length about twice that of its height, the anterior side occupying about three fifths of the entire shell; the posterior side is rather more pointed than in the recent specimens I have compared with, but in Messrs. Forbes and Hanley's description of the living species, it seems to have a considerable range in variation, occasionally resembling our own shell in that character, which appears to be its only difference: in perfect specimens the exterior is covered with regular concentric striæ, and the hinge is formed of an internal ligament of an angular form, deeply inserted, and sloping towards the posterior side; a portion of the ligament was probably seen externally, as a small sinus is formed in the umbo, through which it might have extruded, this pit, or support for the ligament is thickened at the edges, and elevated behind, so as to produce a sort of denticle in the left valve, and immediately before it is a distinct though not a prominent tooth, the same appearances are exhibited in the right valve, in which the tooth is rather more elevated. There are large adductor muscle marks of an ovate form, and the impression by the mantle is entire.

The animal of this species has been recently examined by Mr. Alder, who has published his observations in the 'Ann. and Mag. of Nat. Hist.' for the present year, where he has pointed out a peculiarity in the mantle on the anterior side, by which it appears, he says, to connect the open-lobed form in *Lepton* with the anterior tubular extension of that organ in *Kellia*.

Very extraordinary forms are assumed by the fleshy covering or mantle in many of the animals of this group, presenting us with distinctions so apparently anomalous as to entitle them, if distinguished by that organ alone, to be removed to very distant

positions, but an evident relationship exists between their shelly exteriors, to separate which would be a violation to any natural arrangement.

5. MONTACUTA? DONACINA, *S. Wood.* Tab. XI, fig. 3, *a—c.*

MONTACUTA? DONACINA. *S. Wood.* Cat. of Crag Shells, Ann. and Mag. Nat. Hist., 1840.
— ? CYLINDRICA, var. *Id.*

Spec. Char. Testâ minutâ, transversâ, donaciformi, compressâ, valdè inæquilaterali, lævigatâ; posticè brevissimâ, margine dorsali rectiusculâ, margine ventrali convexiusculâ; cardine edentulâ? foveâ ligamenti profundâ, obliquâ.

Shell small, transverse, compressed, wedge-shaped, very inequilateral, smooth; posterior side very short, dorsal margin on the anterior side, nearly straight, ventral margin convex; hinge without teeth? ligamental area oblique and deep, inclining backwards.

Length, $\frac{1}{4}$. *Height*, $\frac{3}{16}$ths of an inch.

Var. cylindrica. Length, $\frac{1}{6}$th. *Height*, $\frac{1}{11}$th of an inch.

Locality. Cor. Crag, Sutton.

Three or four specimens only of this curious shell have been many years in my Cabinet, but nothing like it, either recent or fossil, has fallen under my observation, by which it can be even generically associated, although it appears very closely allied to this or to the Genus *Kellia*. My two forms therefore are placed here provisionally, with the best figures and descriptions their unfavorable condition will permit, in order to call the attention of future Collectors to their existence.

Figure (*b*) represents the left valve, which is very flat, and very inequilateral; the posterior side being rounded, and scarcely extending beyond the umbo; nearly the whole of the shell is on the anterior side, the dorsal margin of which is nearly straight, but sloping a little from the umbo, the ventral margin convex, becoming narrower at the anterior side, giving a wedge-shaped form to the outline of the shell by having a greater height from the ventral margin direct to the umbo; in the var. β. (fig. *a*) also a left valve, it is not so; the posterior side being there rounded, but not higher than any other part of the shell, and having such difference only in the outline, I imagine it to be merely a variation, as in all its other characters there is a specific resemblance. In an imperfect specimen of the right valve are two small prominences of the edge of the shell, one on each side of the ligamental area, scarcely deserving the designation of teeth, but perhaps a specimen in a better state of preservation might have them more developed. The ligament is wholly internal, placed immediately beneath the umbo in an angularly formed pit, inclining on the posterior side. The exterior is smooth and glossy, with the lines of growth scarcely visible.

Cyamium.* *Philippi*, 1845.

Cyamium? *Lovén*, 1846.
Turtonia? *Hanley*, 1849.

Generic Character. Shell ovate, equivalve, inequilateral, closed, small, and thin: externally free from ornament. Hinge with two cardinal teeth. Palleal impression entire. Ligament internal.

This genus has been proposed for a species found in the Antarctic Seas, with an internal ligament, and was adopted by Dr. Lovén for the little shell called *Mya purpurea* by Montague, which has however been erected into a genus by the Authors of the 'Hist. of Brit. Moll.' under the name of *Turtonia*, in consequence of its having an external ligament.

Cyamium? eximium, *S. Wood.* Tab. XI, fig. 5, *a*, *b*.

Spec. Char. Testâ minimâ, ovatâ, transversâ, inæquilaterali, lævigatâ, tenui; posticè longiore, utrinque rotundatâ; cardine bidentato, uno laterali remoto ponè ligamentum; apicibus prominentibus.

Shell small, ovate, transverse, inequilateral, smooth and thin; posterior side the larger, both sides rounded. Hinge with two cardinal teeth, and one remote lateral tooth behind the ligament; umbones prominent.

Length, $\frac{1}{7}$th. *Height*, $\frac{1}{10}$th of an inch.

Locality. Coralline Crag, Sutton.

One specimen of a species that appears to possess characters most in accordance with the diagnosis of this Genus, is in my Cabinet, and I am induced to place it here provisionally until some more shall be found, either to establish its right to the position, or to remove it; the desire that everything found in the Crag should be brought under notice must be advanced as an apology for the introduction of some few imperfect materials here, as well as elsewhere, in this Monograph.

Our shell has an undoubted right to be specifically removed from *Mya purpurea*, *Mont.*, though in some of its characters there is a resemblance. The specimen figured is the left valve; it has two distinct, rather prominent, soft teeth close to the umbo on the anterior side of the ligament, one standing at right angles to the length of the shell, and the other, a larger one, diverging towards the anterior side, with a sufficient space between them for the insertion of a tooth which the opposite valve is supposed to possess: behind these teeth is a depression, where it is presumed the ligament was placed, and if it were so, it must have been wholly internal, and invisible

* Etym. Κυάμιον, a little bean.

when the valves were closed: behind this ligamental area is a large and somewhat prominent tooth, which may be called a posterior lateral tooth within the dorsal margin, and there is a depression outside of it, such as would receive a corresponding elevation on the edge of the right valve: the posterior side of the shell is the larger, the dorsal margin of which slopes with a gentle and elegant curve from a rather prominent umbo, having a rounded extremity, and a gentle convexity in the ventral margin: the anterior side slopes from the umbo with a straighter line, and is also rounded. The shell is very thin and fragile, and was probably, when living, a semi-transparent species. The muscle marks are wholly invisible.

Cryptodon.* *Turton*, 1822.

Thyasira. *Leach*, MS., 1818, fide *Lam.*
Thyatira. *Id.* MS., 1819, fide *Jeffreys.*
Thiatisa. *Id.* MS., 1819, fide *Gray.*
Bequania. *Id.* MS., fide *Brown.*
Venus (sp.). *Don.*, 1801.
Tellina (sp.). *Mont.*, 1803.
Axinus. *J. Sowerby*, 1821.
— *Lovén*, 1846.
Ptychina. *Phil.*, 1836.
Thiatyra. *G. B. Sow., Jr.*, 1842.

Generic Character. Shell equivalved, subequilateral, tumid, thin, subhyaline, and closed: hinge with a single obtuse, or somewhat obscure tooth in each valve; no lateral teeth. Ligament semi-internal, placed in a linear depression beneath the dorsal margin: impressions of the adductor muscles indistinct, that by the mantle without a sinus.

Animal with an open mantle, but no prolonged siphons, foot long, subcylindrical, and tubular, with a clavate extremity.

The Authors of the 'Hist. of Brit. Moll.' have included this in the Genus *Lucina*, but the animal of the one species that has been examined, appears to present differences sufficient to entitle it to Generic distinction, and the characters of the shell are so decidedly dissimilar, that a separation seems to be required.

There are several claimants for the honour of distinguishing this as a Genus, and the strict right of priority is somewhat difficult to determine. Leach, in his indiscriminate establishment of Genera, proposed several names, some of which were put in print, and he may perhaps be the one most justly entitled. The name by Sowerby has scarcely a better claim, as merely the exterior of the shell has been observed, and the position of the ligament not clearly indicated, as Turton is next in chronological order, his name is here employed.

Species strictly belonging to this genus have not been described from any Formation of an older date than the Tertiaries, the shell called *Axinus obscurus*, from the Magnesian Limestone, belongs to a different group, and has already been made a genus of by Professor King, under the name of *Schizodus*.

* Etym. Κρύπτω, hidden, ὀδούς, a tooth.

1. CRYPTODON SINUOSUM, *Donovan.* Tab. XII, fig. 20, *a*, *b*.

VENUS SINUOSA. *Don.* Brit. Shells, t. 42, fig. 2, 1801.
TELLINA FLEXUOSA. *Mont.* Test. Brit., p. 72, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 56, 1807.
— — *Turt.* Conch. Dict., p. 177, 1819.
— — *W. Wood.* Ind. Test., p. 22, pl. 4, fig. 78, 1825.
AMPHIDESMA FLEXUOSA. *Lam.* Hist. Nat. des An. s. Vert., t. v, p. 492, 1818.
THYASIRA FLEXUOSA. "*Leach*, MS.," *Lam.* Loc. cit. Sup., t. v, p. 492, 1818.
LUCINA SINUATA. *Lam.* Loc. cit., t. v, p. 543, 1818.
— — *Brown.* Illust. Brit. Conch., pl. 17, figs. 4, 6, 1827.
— SINUOSA. *Forbes.* Report on Ægean Invert., p. 182, 1843.
— — *Thorpe.* Brit. Mar. Conch., p. 74, 1844.
— FLEXUOSA. *Flem.* Brit. Ann., p. 442, 1828.
— — *Gould.* Invert. Massach., p. 71, fig. 52, 1841.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 54, pl. 35, fig. 4, 1849.
— — *Reeve.* Conch. Icon. LUCINA, pl. xi, fig. 62.
— SARSII. *Id.* - - - pl. ix, fig. 52.
— GOODHALLI. *J. Sow.* Geol. Trans., 2d Ser., vol. v, pl. 8, fig. 7, 1834.
CRYPTODON FLEXUOSUM. *Turt.* Brit. Biv., p. 121, pl. 7, figs. 9, 10, 1822.
— — *Brown.* Illust. Brit. Conch., 2d ed., pl. 39, figs. 4, 5.
— — *Möller.* Ind. Moll. Groenl., p. 20, 1842.
— — *Alder.* Cat. Moll. North. and Durh., p. 91, 1847.
— BISINUATUM. *S. Wood.* Catalogue, 1840.
PTYCHINA BIPLICATA. *Phil.* En. Moll. Sic., vol. i, p. 15, t. 2, fig. 4, 1836.
AXINUS UNICARINATUS. *Nyst.* Rech. Coq. Foss. d'Anv., p. 6, pl. 1, fig. 22, 1835.
— BENEDENII. *De Koninck.* Des. Coq. Foss. Arg. Boom, p. 35, pl. 11, figs. 2, 3, 1837.
— ANGULATUS. *Nyst* (not *Sowerby*). Coq. Foss. de Belg., p. 141, pl. 6, fig. 13, 1844.
— — *Michel.* Desc. des Terr. Mioc. de l'Ital. Septen. (Haarlem Trans.), p. 118, pl. 4, figs. 23, 23*, 1847.
— FLEXUOSUS. *Lovén.* Ind. Moll. Scand., p. 38, 1846.
— SARSII. *Id.* - - - p. 38, „

Spec. Char. Testâ ovato-orbiculari vel subhexagonâ, lævigatâ, tenui, subpellucidâ, tumidâ, subæquilaterâ; latere postico biplicato, margine ventrali producto, lunulâ cordato-ovatâ, magnâ, impressâ.

Shell ovately orbicular, with an irregularly hexagonal outline, smooth, thin and subpellucid, tumid, and nearly equilateral; posterior side with two folds or furrows, ventral margin produced, and a large and deeply impressed heart-shaped lunule.

Diameter, $\frac{1}{2}$ an inch.

Locality. Cor. Crag, Sutton.

Recent, Ægean Sea, Britain, Scandinavia, and North America.

This species is not at all abundant. There is no doubt of its identity with the recent British shell, and I have given it as an inhabitant of the North West Coast of America, upon the authority of that accurate observer, Dr. Gould. A specimen

obligingly presented to me by Professor E. Forbes, obtained by him in the Ægean Sea, does not offer the slightest difference that could be considered as specific.

The recent shell is nearly transparent in its young state, becoming a little thickened when full grown, and then only the true form of the muscular impressions can be observed, that upon the anterior side is somewhat elongated, and within the mantle mark, but has not the band-like form of the true *Lucina:* the exterior is smooth, with the exception of rather rough lines of growth, and in the centre of the shell there is somewhat of a flattened space, which gives one side of a hexagon to the ventral margin, there are two distinct depressions or sinuses on the posterior side, and the dorsal margin of the shell is produced so as almost to cover over the ligament, which might otherwise be called external, as it acts over a small fulcrum, and opens the valve by its contraction; there is one obtuse tooth in the right valve at the anterior termination, or rather commencement of the ligament, with a corresponding depression in the left valve, and the umbo curves a little towards the anterior, over its large and deep lunule.

Axinus angulatus of 'Min. Conch.' T. 315, is decidedly different, but the older Tertiary shell "*Lucina Goodhallii*" from Hampstead, appears so strongly to resemble our species, that I cannot consider their trifling differences to be more than the result of locality, or of other conditions, and in examining many specimens of this shell in the rich Cabinets of my friends, Messrs. Edwards and Wetherell, I could come to no other conclusion, though all the specimens yet obtained have the two valves so closely united, that their external characters alone are visible. The principal difference appears to be in a rather more rounded outline to the older shell, which has also less deeply produced folds or sinuses on the posterior side, but in the examination of a specimen from Boom, in the Cabinet of Sir Charles Lyell, these posterior sinuses were more strongly marked than in our Crag shell, with a rather larger and deeper lunule, while the specimen itself exceeded in magnitude any of my own, and judging from the figure and description of the Scandinavian shell *Axinus Sarsii*, Lovén, it does not appear to vary sufficiently to be considered specifically distinct.

It is quoted by Nyst as a fossil from Bordeaux.

2. CRYPTODON FERRUGINOSUM, *Forbes.* Tab. XII, fig. 19, *a*, *b*.

CRYPTODON ROTUNDATUM. *S. Wood.* Catalogue, 1840.
KELLIA FERRUGINOSA. *Forbes.* Ægean Invert. Rep. Brit. Assoc., p. 192, 1843.
ARTEMIS ? — *Jeffreys.* Ann. Nat. Hist., vol. xix, p. 313.
CLAUSINA — *Id.* - - - vol. xx, p. 18.
— ABYSSICOLA. *Id.* - - - - p. 18.
— CROULINENSIS. *Id.* - - - - p. 19.
LUCINA FERRUGINOSA. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 60, pl. 34, fig. 1, 1849.

Spec. Char. Testâ minimâ, rotundato-ovatâ, obliquâ, subæquilaterali, tumidâ, lævigatâ, tenui, fragili; latere postico obsoletè uniplicato; dente cardinali unico, obtuso.

Shell small, roundedly ovate, oblique, subequilateral, tumid, smooth, thin, and fragile; posterior side with one obsolete fold or furrow, one obtuse cardinal tooth.

Diameter, $\frac{1}{8}$th of an inch.

Locality. Coralline Crag, Sutton. Recent, North Britain, and Ægean Sea.

This is not an abundant fossil, and I have only met with it in the rich Depôt at Sutton.

When my Catalogue was compiled this species had not been recognised in the recent state, and the name then proposed for it being without description, or anything by which it could be identified, must give way to the subsequent one of Professor Forbes. In comparing our fossil with the specimens now obtained in the British Seas, no essential difference can be detected, and there is little doubt of their identity, and when it is considered that the recent shell has been separated into three distinct species, more than ordinary range in variation may be expected; the fossil is, however, free from the ferruginous covering which obscures some of the characters of the living shell; the Authors of the 'Hist. of Brit. Moll.' after uniting the three species of Mr. Jeffreys, describe their shell as entirely without a fold, but in the most perfect specimens of our fossil may be seen an obscure inflection upon the posterior side, which is here considered to constitute one of its most determinable characters, and has always been in my Cabinet under the MS. name of *Cryptodon*, from that resemblance. In the few specimens that I possess no great variation is observable; the general form is obliquely orbicular, the diameter rather greater when measuring from the umbo to the ventral margin than from the anterior to the posterior side, and in some specimens the outline shows a decided pentangular form. There is one obscure tooth in each valve, like that in the preceding species, and the ligament is placed in a depression beneath the dorsal margin, so that it must have been nearly hidden when the valves were united; the anterior muscle mark is large, and of an ovate form, and not band-like as in *Lucina*. This shell has much the aspect of *Kellia*, and might, without much violence to classical arrangement, be placed there, or at least, judging from the characters of the shell alone, it appears to have a nearer relationship to that genus than to *Lucina*. In the living state it has only been met with as a deep-water shell, both from the Ægean and the North British Seas, ranging from 20 to 100 fathoms.

Loripes,* *Poli*, 1791.

Loripes—Loripoderma. *Poli.*
Tellina (sp.). *Linn.*
Amphidesma (sp.). *Lam.*, 1818.
Thiatisa (sp.). *Leach*, 1819,
Ligula. *Menke*, 1830, } fide *Gray*.
Ungulina. *Bosc.*, 1802.
Taras? *Risso.*, 1826.

* Etym. *Lorum*, a strap, and *pes*, a foot.

Generic Character.—Shell orbicular, subequilateral, equivalve, lenticular; smooth or striated externally. Hinge with one or two cardinal and two lateral teeth; the latter sometimes obsolete. Muscular impressions unequal, anterior one the longer, mantle mark without a sinus. Ligament internal.

Animal of the form of the shell, mantle open in front, with the margins crenulated; foot subcylindrical, crooked, club-shaped at the extremity, one siphon.

Although the animal is closely allied to *Lucina*, it appears to be entitled to generic distinction, on account of the difference of position in regard to the ligament, being wholly internal, whereas in the other it is placed externally upon a ledge or fulcrum; the reported difference in the siphonal opening is also an additional reason for the separation.

This is a recent genus, and its age, as far as it is known to me, does not extend beyond the Middle Tertiaries.

1. LORIPES DIVARICATA, *Linnæus.* Tab. XII, fig. 4 *a*, *b*.

TELLINA DIVARICATA. *Linn.* Syst. Nat., ed. 12, p. 1120, No. 70, 1767.
— — ? *W. Wood.* Ind. Test., p. 23, pl. 4, fig. 87, 1825.
— DIGITARIA. *Poli.* Test. utri. Sic., vol. i, p. 47, t. 15, fig. 15, 1791.
CARDIUM ARCUATUM. *Mont.* Test. Brit., p. 85, pl. 3, fig. 2, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 67, 1807.
LUCINA ARCUATA. *Flem.* Brit. An., p. 442, 1828.
— — *Reeve.* Conch. Icon. LUCINA, pl. 11, fig. 61.
— DIVARICATA. *Woodward.* Geol. of Norf., p. 43 (not reference).
— — *Galeotti.* Mém. de l'Acad. Roy. de Brux., t. xii, p. 157, No. 137, pl. 3, fig. 18, 1835.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 52, pl. 35, fig. 3, 1849.
— TRIFARIA. *Krynecki.* Bull. des Nat. de Mosc., p. 62, No. 11, 1837. Sec. *Midd.*
— COMMUTATA. *Phil.* En. Moll. Sic., vol. i, p. 32, t. 3, fig. 15, 1836.
— — *Forbes.* Rep. Ægean Invert., p. 182, 1843.
— — *Middendorff.* Malacozool. Ross., p. 566, (Mém. de l'Acad. des Sci. de St. Petersb., 1849.)
— N. S. *allied to* DIVARICATA. *G. Sow.* and *S. Wood.* Mag. Nat. Hist., vol. iii, p. 325, 1839.
LORIPES UNDULARIA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ orbiculari, subæquilaterali, convexâ, bifariam oblique striatâ, divaricatâ, cardine dentibus lateralibus munito; margine minutissmè crenulatâ.

Shell orbicular, nearly equilateral, ornamented with oblique divaricating striæ; hinge furnished with lateral teeth, and the margin very finely crenulated.

Diameter, ½ an inch nearly.

Locality. Red Crag, Sutton.
Mam. Crag, Bramerton. Recent, Mediterranean, Britain.

This species appears first in the Red Crag, where it is very scarce, but I believe it is rather more plentiful in the Mam. Crag, though not very abundant there: as a

recent British shell it is one of our rarest species. In a comparison with Montague's specimen, now in the British Museum, I was not able to detect the slightest difference.

Our shell may be further described as very nearly orbicular, though in some specimens, from a slight prominence of the umbo, the diameter is rather greater in height: the hinge is furnished with one rather obtuse and angular tooth in the right valve, and two lateral teeth, the posterior one is the more distant; in the left valve are two diverging cardinal teeth, with two lateral indentations corresponding to the teeth of the opposite valve, and the ligament is placed behind the cardinal teeth in an oblique fossette: the adductor muscle marks are slightly unequal: the anterior one is somewhat elongated, but it has not the band-like form of the true *Lucina:* that by the mantle is quite entire: the interior is often furnished with numerous radiating striæ, and the margin in very perfect specimens is finely crenulated. The exterior is ornamented with diverging or divaricating striæ, or rather ledges varying from 25 to 30, they are slightly undulatory and have the ledge or elevated part on the upper side or towards the umbo, and are crossed by the lines of growth: the divergence is from an imaginary line a little on the anterior side, at an angle generally of about 100°.

This is the only species with these peculiar markings that I have seen: the shell from the Older Tertiaries, which is abundant in the Hordwell Cliff, has the ligament placed wholly externally upon a projecting fulcrum, and the species from Bordeaux, with the same specific name, differs in the like character, as also do the West Indian shells.

There are, probably, several species possessing these diverging and curving radiations, all of which have been united under the name of *divaricata*, and a long extension of Geological Age, as well as a wide Geographical distribution, have been given in consequence. The common West India shell, and the Older Tertiary fossils, also belong to the true *Lucina*.

Lucina,* *Bruguière*, 1792.

Venus (sp.). *Linn.*
Tellina (sp.). *Mont.*, 1803.
Cyrachæa. *Leach*, MS., 1819, fide *Gray*.
Myrtea. *Turt.*, 1822.
Phacoides. *Blainv.*, 1825.
Ortygia (sp.). *Brown*, 1827.

Generic Character. Shell equivalve, generally equilateral, lenticular, compressed, occasionally tumid; surface more or less ornamented with concentric striæ or elevated ridges, sometimes with radiating striæ or costæ. Hinge usually with two diverging cardinal teeth in each valve, and two lateral teeth, which in some species

* Etym. A Proper Name.

become obsolete: anterior muscular impression of a ligulate or elongated form. Palleal impression without a sinus. Ligament external.

The animal of this genus is described as having its mantle open in front, and fimbriated edges; very short siphonal tubes, with a long cylindrically-formed foot.

The genus as here restricted is intended to include all those species which have an external ligament, of which the *Venus borealis* of Linnæus may be considered the type. This appears to form a distinct group, characterised by a differently formed anterior muscle, which the mantle seems to envelope, and the impression is isolated within: the edge of the mantle extending up to the anterior part of the adductor, and not on the posterior edge where the line of the mantle mark, in most of the *Dimyaria*, connects the two muscles.

1. LUCINA BOREALIS, *Linnæus*. Tab. XII, fig. 1 *a*, *b*.

VENUS BOREALIS. *Linn.* Syst. Nat., ed. 12, p. 1134, No. 143, 1767.
— — *Don.* Brit. Shells, vol. iv, t. 130, 1803.
— EXOLETA ÆQUILATERA. *Chem.* Conch. Cab., t. vii, p. 22, t. 38, fig. 406, 1784.
— SPURIA. *Gmel.* Syst. Nat., p. 3284, No. 72, 1788.
— — *Dillw.* Desc. Cat. Rec. Shells, p. 194, 1817.
— CIRCINATA? *Broc.* Conch. Foss. Subap., p. 552, t. 14, fig. 6, 1814.
TELLINA RADULA. *Mont.* Test. Brit., p. 68, 1803.
— — *W. Wood.* Ind. Test., p. 21, pl. 4, fig. 71, 1825.
LUCINA RADULA. *Turt.* Brit. Biv., p. 116, 1822.
— — *Phil.* En. Moll. Sic., p. 35, t. 3, fig. 17, 1836.
— — *Gould.* Invert. Massach., p. 69, 1841.
— — *Macgill.* Moll. Aberd., p. 255, 1843.
— — *Dekay.* Nat. Hist. New York Zool., pl. 26, fig. 274, 1843.
— ALBA. *Turt.* Brit. Biv., p. 114, t. 7, figs. 6, 7, 1822.
— ANTIQUATA. *J. Sow.* Min. Conch., t. 557, fig. 2, 1827.
— — *Woodward.* Geol. of Norf., p. 43, 1833.
— — *Nyst.* Coq. Foss. de Belg., p. 128, pl. 6, fig. 7, *a*, *b*, 1844.
— CONTRACTA? *Say.* Journ. Acad. Nat. Sc., vol. iv, p. 145, pl. 10, fig. 8.
— — ? *Conrad.* Am. Mioc. Foss., p. 40, pl. 20, fig. 5, 1838.
— FLANDRICA. *Nyst.* Coq. Foss. de Belg., p. 127, pl. 6, fig. 6, *a*, *b*, 1844.
— BOREALIS. *Lovén.* Ind. Moll. Scand., p. 38, 1846.
— *Alder.* Cat. Moll. North. and Durh., p. 91, 1848.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 46, pl. 35, fig. 5, and pl. M, fig. 6, 1849.
— MITIS. *Woodward* (not *Sow.*). Geol. of Norf., p. 43, 1833.

Spec. Char. Testâ orbiculari, lenticulari, compressiusculâ; striis concentricis numerosis, erectis, approximatis vel distantibus; anticè rotundatâ, posticè subquadratâ, lunulâ lanceolatâ, cardine bidentato.

Shell orbicular, lenticular, somewhat compressed, covered with numerous concentric, erect striæ or ridges, close or distant; anterior side rounded, posterior of a squarish outline, lunule small, elongate, hinge with two cardinal teeth.

Diameter, $1\frac{7}{8}$ths of an inch.

Locality. Cor. Crag, Sutton, Ramsholt, Sudbourn, and Gedgrave.
Red Crag, Passim.
Mam. Crag, Postwick and Thorpe.
Recent, Mediterranean, Britain, Scandinavia, and North America.

This is one of our most abundant shells in the Coralline as well as in the Red Crag.

In the young state, it is rather less equilateral than in the adult, and has comparatively a larger and deeper lunule, with the teeth more distinct and prominent. It is nearly orbicular, though sometimes there is a trifling difference in the dimensions, the diameter from the anterior to the posterior side exceeding that from the umbo to the ventral margin, and *vice versâ*. In the right valve are two cardinal teeth, one large and bifid, the other small and simple, with a prominent lateral tooth on the anterior side, and in the left are also two cardinal teeth, one simple and the other bifid, but their positions are reversed, the bifid one in the left being the anterior, with a corresponding lateral tooth on that side. The interior is often strongly marked with radiating striæ, most distinct beyond the edge of the mantle mark: there are two deep impressions by the adductor muscles, the posterior of an ovate form, the anterior one is much elongated, being as it were bipartite, that nearest the anterior lateral tooth of the usual form, with a ligulate prolongation down to near the middle of the shell; in addition to which, in the interior about the centre is a banded impression extending half way across the shell, in a direction at right angles to the ligamental fulcrum, as if the mantle had there a division. In some specimens, the exterior is covered with close-set lamellated striæ, and the shell is somewhat tumid, while in others the shell is flat or much compressed, and the concentric markings distant. A little inflection is always to be seen on the posterior side, producing a more or less distinctly marked sinus, and both sides are generally a little elevated, giving the shell the appearance of being high-shouldered. A small but distinct lunule is visible, curving strongly near the umbo, which gives to the young shell a comparatively larger mark there than when it is full grown. This shell is said in the recent state to have a range from low water-mark to the depth of 90 fathoms.

2. LUCINA CRENULATA, *S. Wood*. Tab. XII, fig. 7 *a*, *b*.

LUCINA CRENULATA. *S. Wood*. Catalogue, 1840.
— STRIATULA? *Nyst*. Rech. Coq. Foss. de Hoesselt et Kl. Sp., p. 5, No. 11, pl. 1, fig. 11, 1836.
— — ? *Nyst*. Coq. Foss. Belg., p. 131, pl. 6, fig. 9, *a*—*c*, 1844.
— DENTATA? *Goldf*. Pet. Germ., vol. ii, p. 230, t. 147, fig. 1.
— CRENULATA. *Conrad*. Amer. Mioc. Foss., p. 39, pl. 20, fig. 2.

Spec. Char. Testâ parvâ orbiculari, æquilaterali, convexâ, concentricè striatâ, striis numerosis confertis, lunulâ impressâ, elongato-ovatâ; dentibus lateralibus distinctis; margine crenulatâ.

Shell small orbicular, equilateral, convex, concentrically striated, striæ close-set, and numerous; an ovate impressed lunule; lateral teeth distinct; margin crenulated.

Diameter, $\frac{1}{4}$ of an inch.

Locality. Coralline Crag, Sutton.

This species is exceedingly abundant, but restricted, as far as I have seen, to one locality, where, from the prominence of the lateral teeth, the valves are sometimes found united.

Our shell is furnished with one cardinal, obtuse, triangularly formed tooth in the right valve, and a distinct and distant lateral tooth on each side: in the left valve are two cardinal diverging teeth, with a triangular space between them, also two lateral teeth: anterior muscle mark large, but not very narrow. The striæ upon the exterior are rounded, and about as broad as the spaces between them, and the posterior side is marked with an obscure ridge, produced by a slight inflection of the margin on that side, and at the ridge the striæ often bifurcate, being less numerous upon the inflected portion.

A shell in my Cabinet from Bordeaux, which I presume to be *Lucina dentata*, Bast., appears to differ from the Crag shell in several characters, it is more tumid, rather wider in a contrary direction to our shell, and is more finely striated externally, and has not so distinct a ridge on the posterior side; the anterior tooth is the more prominent in our shell, and the inside has fine radiating striæ, which I do not observe in Basterot's species; in ours the ligament is wholly external, placed on a prominent fulcrum; in the Bordeaux shell it is internal, placed obliquely beneath the umbo, and if I am right in the species, belongs to the genus *Loripes*.

Lucina striatula, Nyst, may possibly be the same as our shell, though it is distinctly stated by that author to have the margin free from crenulations, but, judging from the locality, his shell may perhaps belong to the older or Bordeaux species.

From the description and figure of the American fossil by Conrad, I presume his shell to be the same species. We have seen the preceding (*borealis*) to have a range from the Mediterranean to the Coast of the United States, and there is great probability that the fossil from the Upper Tertiaries of that side of the Atlantic is identical with our own; it is somewhat singular the author should have chosen for his shell the same name under which the Crag species had passed in my Catalogue, and the coincidence is perhaps the more remarkable, the American fossil having been obtained from Suffolk, in Virginia.

3. Lucina decorata, *S. Wood*. Tab. XII, fig. 6 *a*, *b*.

Lucina squamosa? *Goldf.* Pet. Germ., vol. ii, p. 230, t. 147, fig. 3, *a*, *b*.

Spec. Char. Testâ transversâ, ovatâ, inæquilaterali, crassâ, striis radiantibus, et decussantibus ornatâ; lunulâ magnâ, lanceolatâ; cardine unidentato, dentibus lateralibus perspicuis: umbonibus prominentibus.

Shell transverse, ovate, inequilateral, thick, and strong; ornamented with radiating striæ, decussated by concentric ridges; a large elongated lunule; hinge with one cardinal tooth and two lateral teeth in each valve: umbones prominent.

Length, $\frac{1}{4}$ of an inch. *Height*, $\frac{3}{16}$ths of an inch.

Locality. Cor. Crag, Sutton.

This is by no means an abundant shell, and the above dimensions are to the full amount of my largest specimen.

It is a pretty species, covered externally with large obtuse rays, or depressed ribs, they are but few in number in the young state, increasing as the shell enlarges by the introduction of an intermediate ray, sometimes diverging in pairs; they are crossed by large obtuse ridges, or thickened lines of growth, placed sometimes in pairs, generally more irregular; the shell is nearly oval, but the anterior side is much the larger of the two, the umbo is elevated, and immediately beneath it is one triangular, sub-bifid tooth in the right valve, with two distinct, nearly equidistant lateral teeth, and in the left valve are two, diverging on each side of the triangular space, for the reception of the one of the right valve, with two lateral teeth: the rays are visible within the shell, and the muscle marks are not very deeply seated: the anterior one is elongated, though not strictly of that ligulate or tongue-shaped form so characteristic of the true *Lucina*. *Tellina reticulata*, Poli. (*Lucina pecten*, Phil., 'En Moll. Sic.,' p. 31, T. 3, fig. 14), slightly resembles our shell, but it has finer and more numerous rays, and is more orbicular.

Some time since I sent over to M. Deshayes a few specimens of three or four species, thought to bear a very close resemblance to those of the Paris basin, requesting he would be kind enough to compare them with his own types; and since the first part of my MS. had gone to press, I have received a communication from that gentleman, who has obligingly complied with my request. He says: "J'ai examiné avec la plus grande attention vos trois espèces *Lucina squamosa*, *Erycina miliaria*, and *Nucula miliaris*, avec les types qui me restait dans ma collection et il resulte pour moi de cet examen répété un grand nombre de fois, qu'aucune de vos espèces n'est parfaitment identique avec celles de notre bassin Parisien. Ces espèces et les notres ont entre elles de grandes resemblances mes elles offrent aussi des differences constantes."

The means of determination possessed by M. Deshayes are probably sufficient to enable him justly to separate the Crag shell from the Older Tertiary species, and I have given a new name to our fossil upon such decision; and in consequence of the above opinion so strongly expressed, I have re-examined my own Crag specimens of *Nucinella miliaris* with what I have considered as the same species from the Paris basin in my own Cabinet, but with a high respect for the opinion of that able naturalist, I cannot reconcile myself to the belief, that the differences observable between the two are sufficiently prominent to justify a specific removal for the British fossil.

DOUBTFUL.

4. LUCINA COLUMBELLA, *Lamarck.*

LUCINA	COLUMBELLA.	*Lam.* Hist. des An. s. Vert., t. v, p. 543, No. 15, 1818.
—	—	*Basterot.* Mém. Geol. des Env. de Bord., p. 86, pl. 5, fig. 11, 1825.
—	—	*Bronn.* Lethæa Geogn., p. 959, t. 37, fig. 15, *a—d*, 1837.
—	—	*Dujard.* Mém. de la Soc. Geol. de France, tom. ii, pt. 2, p. 258, 1837.
—	—	*Dubois de Mont.* Foss de Wolhyn., p. 57, pl. 6, figs. 8—11, 1831.
—	—	*G. B. Sowerby.* Genera of Shells, No. 27, fig. 6.
—	—	*Phil.* En. Moll. Sic., vol. ii, p. 26, 1844.
—	—	*Reeve.* Conch. Icon. LUCINA, pl. 6, fig. 30.
—	VULNERATA.	*De France*, sec. *Basterot.*

Three specimens of this species are among the Red Crag Fossils in the Woodwardian Museum at Cambridge; and as it will be seen by the above references, it was an inhabitant of the Seas which deposited the Bordeaux Beds, found also in the Faluns of Touraine, in the Plateau Wolhyni-Podolien, and according to Philippi, has been obtained at Sortino, in the Val di Noto, it is very possible it may have had an extension into the Red Crag, more especially as a shell resembling this (probably only a variety) is still a living species on the N. W. Coast of Africa.

No satisfactory information respecting these so called Red Crag specimens could, however, be given by any of the gentlemen connected with the Cambridge Museum, although Professor Sedgwick says he believes them to be true Crag shells, but being myself unable thoroughly to examine their lithological character, and never having seen the same species in any other Collection of Crag Fossils, and in the absence of all knowledge of their correct locality, they must, at least for the present, be considered as not strictly entitled to a place in the undoubted Fauna of that Period.

DIPLODONTA,* *Bronn.* 1831.

TELLINA (sp.). *Mont.*, 1803.
MYSIA (sp.). *Leach*, MS., 1819. *Brown*, 1827.
VENUS (sp.). *Broc.* *Nyst.*
LUCINA (sp.). *Def.* *Desh.*
DIPLODONTA. *Bronn.*, 1831.
SPHÆRELLA? *Conrad*, 1838.

Generic Character. Shell somewhat thin, more or less orbicular, equivalve subequilateral, externally smooth, or slightly marked by lines of growth, umbones not very prominent. Hinge composed of two cardinal teeth in each valve, the anterior one in the right valve simple, the other bifid, and the reverse in the left, no lateral

* Etym. Διπλόος, double, ὀδούς, a tooth.

teeth. Ligament external, no lunule. Impressions by the adductors ovate; mantle mark without a sinus.

Animal of the form of the shell, with its mantle closed all round, except in front, through which a lanceolate-shaped foot is protruded: margin of the mantle with plain edges. Siphons are said to be wholly wanting.

Our recent British species has been examined by Mr. Clark, who has pointed out an apparent anomaly by which it differs from the generality of *Dimyaria*, in being wholly destitute of anything resembling siphonal tubes, and without an orifice, except the pedal one, he says, for the admission of water to sustain the functions of life.

Its position among the *Lucinidæ* is at present considered doubtful by the Malacologists, in consequence of this anomalous character in regard to the mantle; the shell, however, so strongly resembles many of the species of this group, that no other position seems so appropriate.

1. DIPLODONTA ROTUNDATA, *Montague*. Tab. XII, fig. 3 *a*, *b*.

TELLINA ROTUNDATA. *Mont.* Test. Brit., p. 70, t. 2, fig. 3, 1803.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 56, 1807.
— — *W. Wood.* Ind. Test., p. 22, pl. 4, fig. 77, 1825.
MYSIA ROTUNDATA. *Brown.* Illust. Brit. Conch., pl. 16, fig. 11, 1827.
— — *Id.* Conch. Text. Book, p. 132, pl. 17, fig. 6, 1837.
— MONTAGUI. *Leach*, MS., fide *Brown.*
LUCINA ROTUNDATA. *Turt.* Brit. Biv., p. 114, pl. 7, fig. 3, 1822.
— — *Thorpe.* Brit. Mar. Conch., p. 73, 1844.
— — *Forbes.* Report on Ægean Invert., p. 180, 1843.
— — *Brown.* Brit. Conch., 2d ed., pl. 40, fig. 11.
— — *Reeve.* Conch. Icon. LUCINA, pl. vii, fig. 36.
PSAMMOBIA ROTUNDATA. *Flem.* Brit. An., p. 438, 1828.
DIPLODONTA ROTUNDATA. *Phil.* En. Moll. Sic., vol. ii, p. 24, 1844.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 66, pl. 35, fig. 6, and pl. M, fig. 7, 1849.

Spec. Char. Testâ suborbiculari vel trapezoidea, inæquilaterali, posticè latiore et longiore, subquadratâ, anticè rotundatâ; apicibus prominulis; margine dorsali ferè rectilineo: cardine bidentato.

Shell suborbicular, or of a roundedly trapezoidal form, inequilateral, posterior side the longer, broader, and somewhat square, anterior rounded, with slightly prominent umbones: dorsal margin nearly straight: hinge with two teeth.

Length, $1\frac{1}{8}$th of an inch.

Locality. Coralline Crag, Sutton, Ramsholt, Sudbourn, Gedgrave.
Red Crag, Sutton. Recent, Mediterranean, and British Seas.

This is a shell exceedingly abundant in the Coralline Crag, where specimens may be obtained from nearly $1\frac{1}{4}$ inch in diameter to those which are less than $\frac{1}{8}$th of an inch. In the Red Crag it is also found, but less abundantly. The hinge in

both valves is furnished with two teeth, one simple, the other bifid, the simple one is placed before the umbo in the right valve, and the bifid one is anterior in the left, while the ligament occupies a position wholly external, and is deeply inserted: the muscle marks are large and well impressed, of an oblong form, with the mantle mark entire: numerous fine radiating striæ are often visible in the interior, like some of the *Lucinæ*, the outside is what may be called smooth, having only the irregular lines of increase. The shell is somewhat flattened, though occasionally tumid, more especially on the posterior side.

I have followed Philippi in assigning the Mediterranean shell to this species, as he has done in his second volume, the figure in the first volume more resembles the next species, for which it was taken when my Catalogue was compiled.

2. DIPLODONTA DILATATA, *S. Wood.* Tab. XII, fig. *a*, *b*.

DIPLODONTA DILATATA. *S. Wood.* Catalogue, 1840.
— — ? *Nyst.* Coq. Foss. de Belg., p. 138, pl. 7, fig. 1, 1844.
— — *J. Sow.*, in Dixon. Geol. and Foss. of the Tert. and Cret. Form. of Sussex, p. 167, t. 3, fig. 16, 1850.
VENUS FRAGILIS? *Nyst* and *West.* Nouv. Rech. Coq. Foss. d'Anv., p. 9, pl. 3, fig. 11.

Spec. Char. Testâ transversâ, ovatâ, inflatâ, inæquilaterali, tenui, posticè longiore utrinque convexâ; margine dorsali rotundato; apicibus obtusis, depressis.

Shell transversely ovate, tumid, inequilateral, thin, posterior side the larger, both sides convex; dorsal margin rounded; umbones obtuse, depressed.

Length, $\frac{3}{4}$ths. *Height*, $\frac{5}{8}$ths of an inch.

Locality. Coralline Crag, Sutton, and Gedgrave. Red Crag, Sutton.

This species is not at all abundant. There are about a dozen specimens in my Cabinet presenting characters that appear of sufficient prominence to entitle it to be considered as different from the preceding one, and a few more particulars may therefore be pointed out to support the opinion. Our shell is more regularly rounded on both sides, and has not the squareness of outline so conspicuously shown in that species, where the dorsal margin forms a straight line, giving a distinct angle on the posterior side, whereas in this one it is eminently rounded, and the whole shell is more regularly tumid; the posterior side is considerably the larger, and the umbones are rather depressed, turning a little towards the anterior, and the ligamental area is smaller than in the preceding species; the shell is thin, and the muscle marks not very well defined, but where they are seen, they appear to be different in size, the posterior one being the longer, and of a rounded oblong form, and that by the mantle without the least inflection; the teeth are two in each valve, one simple, the other bifid, the posterior one is simple in the left valve, in the right it is anterior; the bifid one is less, and the single one is better defined than in the preceding species; the whole aspect of the shell is also different, that I have no hesitation in separating the two. This species and *rotundata*

are found in the same locality, and I have one specimen from the Red Crag in good preservation, exhibiting the same distinction. The figure by Nyst more strongly resembles this species than the last one, so also does that by Philippi. The latter author states his shell to be living in the Red Sea, thus giving a greater probability to its being different from the one living in the British Seas; a few specimens of apparently the same species from the Older Tertiaries at Bracklesham are in the Cabinet of Mr. Edwards, one of which has been figured in Mr. Dixon's work above referred to. In comparing them with the Crag specimens some trifling differences may be observed, but they do not appear of sufficient importance for specific distinction, and the Crag shell is in all probability the prolonged existence of the Bracklesham fossil. In dental characters they are precisely the same, but the Crag shell is rather more tumid, and it is also a little longer, the dorsal margin being somewhat less rounded than in the older shell, and the exteriors of the Crag specimens have merely fine and somewhat irregular lines of growth, while the Bracklesham fossil has rather more regular concentric striæ, they however both present sufficient distinction to justify a separation from the recent British species.

3. DIPLODONTA? ASTARTEA, *Nyst.* Tab. XII, fig. 2, *a*, *b*.

TELLINA ASTARTEA. *Nyst.* Rech. Coq. Foss. d'Anv., p. 5, pl. 1, fig. 18, 1835.
LUCINA GYRATA. *S. Wood.* Catalogue, 1840.
— ASTARTEA. *Nyst.* Coq. Foss. de Belg., p. 121, pl. 6, fig. 4, 1844.
MYSIA AMERICANA? *Conrad.* Foss. Shells of the Med. Tert. United States, p. 30, pl. 16, fig. 2.
DIPLODONTA PARVULA? *Nyst.* Coq. Foss. de Belg., p. 139, pl. 7, fig. 2, 1844.

Spec. Char. Testâ obliquâ, ovato-obiculari, depressiusculâ, inæquilaterali; in senectute intus spissatâ; posticè majore, anticè subangulatâ; dente cardinali bifido.

Shell oblique, ovately orbicular, somewhat depressed, inequilateral, inside of specimens thickened; posterior side the larger, anterior subangulated: cardinal tooth bifid: no lunule.

Diameter, $\frac{3}{4}$ths of an inch.

Locality. Cor. Crag, Sutton. Red Crag, Sutton.

This shell is very abundant in the Red Crag, but it is rather scarce at one locality, from the Older Formaiton of the Coralline Crag, and presents some slight differences, though not sufficient to remove it from the species.

Our shell measures three quarters of an inch from the anterior to the posterior side, and about the same or a trifle less from the umbo to the ventral margin, these proportions are occasionally reversed, but there is in general not much variation in this species: it is somewhat oblique, and measures rather more from the dorsal edge or position of the ligament to the opposite margin than in a contrary direction, although, in the young shell, it is the reverse; the umbones are prominent, the hinge has one simple and one bifid tooth in each valve, the surface is marked with somewhat irregular lines of growth at considerable distances. The interior in the adult shell is much thickened,

as in some of the species of *Lucina*, showing the muscle marks deeply impressed; they are nearly equal in size, though the anterior one is rather narrower, the line of the mantle is without the least inflection: in the thickening of the interior a ridge is produced near the upper anterior margin, giving the appearance of an additional muscle mark; a similar appearance may be seen in the old specimens from the Coralline Crag, besides an obscure ridge running down the centre dividing it into two nearly equal parts. There is no doubt of this species being identical with the Belgian fossil, and according to M. Nyst, it is said to have been found in the Older Tertiaries from the environs of Paris. I have not seen it from the Mam. Crag.

D. apicalis, Phil., somewhat resembles the young of our shell, but it appears to have a greater comparative height from the umbo to the margin; and I have been unable to see a specimen of this or of *D. trigonula*, Bronn, which also does not very greatly differ.

The dentition of this species precisely resembles that of *D. rotundata*, as well as the muscle marks of the interior, from which it is presumed to belong to the same genus, but the interior of aged specimens is thickened like those of *Lucina*, to which it appears to be very closely related. The specimen figured has a somewhat sinuated form in the margin on the posterior side, which is merely accidental; it was selected for the purpose of showing the interior.

Lucinopsis, *Forbes* and *Hanley*, 1849.

Mysia. "*Leach*," *Lam.*, 1818. *King*, 183-? *S. Wood*, 1840.
Venus (sp). *Penn. Mont. Flem. Phil. Lovén.*
Lucina (sp.). *Turt. Lam.*
Cytherea (sp.) *Macgill*, 1843.
Artemis (sp.). *Alder*, 1847. *Recluz.*
Dosinia (sp.). *Gray*, 1847.

Generic Character. "Shell more or less orbicular, rather thin, equivalve, slightly inequilateral, closed; surface smooth or concentrically striated, inner margin entire; muscular impressions oblong or suborbicular, nearly equal. Palleal sinus wide, deep, central, obtuse. Hinge composed of two diverging central teeth, one of which is bifid in the right valve, and three, the central one bifid, in the left. Ligament external, prominent, rather long. No defined lunule."

"Animal suborbicular, its mantle freely open, the margins entire. Siphonal tubes short, diverging, separate, the branchial with its orifice fringed, the anal simple. Foot lanceolate. Labial paps, small, triangular."

This being the first and only diagnosis of the genus I have seen, it is copied from the authors of the 'Hist. of British Mollusca,' whose name is here adopted.

The long and well-known British species *Venus undata*, of Pennant, is considered as the type of the genus.

It has been justly remarked, by Messrs. Forbes and Hanley, that in consequence of its anomalous character, this shell has been bandied about and placed in many different genera, but generally with a doubt respecting its true position; the deep palleal sinus indicated the possession of somewhat elongated or at least projecting siphons, thereby differing from the animals of true *Lucina*, in which genus some authors had placed it, where from its dental characters and general appearance it seemed most entitled to be situated. They have, however, removed it from among the family *Lucinidæ*, and placed it in the *Veneridæ*, in consequence of the deeply sinuated form of the palleal impression; and this view of its connection seems to have been taken by other Malacologists.

The possession of a sinus in the impression of the mantle mark is a distinction, we have elsewhere seen, in all probability sufficient for the removal of a shell with such a character out of a genus, where others have the mantle mark perfectly entire, but there is no sufficient reason in that alone that it should be removed to any very distant position. Its general affinities appear more in connection with those of *Lucina* than with those of *Venus*, differing from the former only in the aberrant character of a prolongation in the siphonal tubes, bearing the same relationship to *Lucina*, or rather to *Diplodonta*, that *Leda* does to *Nucula*, or as *Adacna* to *Cardium*: I have, therefore, again ventured to remove it from among the *Veneridæ* to what appears a more correct position.

The name of *Mysia* was proposed in MS. for a genus by Dr. Leach, in which the *Venus undata*, Penn., was placed; and this name has been published by Lamarck in his 'Hist. Nat. des An. sans Vert.,' t. v, p. 543, 1818, thereby giving it a status in regard to time; and considering that sufficient for its right to priority, it was adopted by myself in 'The Catal. of Crag Shells,' for the Crag species, but another well-identified shell belonging to the genus *Diplodonta* had also attached to it the same generic name, and this was published by Brown, in 1827. It is not now possible to say which of the two species was intended as the type of his proposed new genus, and therefore, to unravel the difficulty, or rather to cut the Gordian knot, the authors of *Lucinopsis* have, perhaps wisely, rejected in toto the name of *Mysia*.

This appears a very natural genus, although very few species are yet known either in a recent or fossil state. Two or three shells from the Greensand Formation, figured and described under the name of THETIS, somewhat resemble it in the dental characters, but they have a deeper and more angulated sinus in the mantle mark.

1. LUCINOPSIS LAJONKAIRII, *Payraudeau*. Tab. XI, fig. 14, *a*—*c*.

Ency. Method., p. 272, fig. 2, *a*—*b*, 1800.

VENERUPIS LAJONKAIRII. *Payr.* Cat. Moll. de l'Ile de Corse, p. 36, pl. 1, figs. 12, 13, 1826.

— — *Desh.* 2d ed. Lam., t. vi, p. 164, 1835.

VENUS LUPINOIDES. *Nyst.* Rech. Coq. Foss. Prov. d'Anv., pl. 11, No. 41, pl. 3, fig. 14.

MYSIA ORNATA. *S. Wood.* Catalogue, 1840.

TELLINA LUPINOIDES. *Nyst.* Coq. Foss. de Bëlg., p. 111, pl. 5, fig. 4, *a*—*c*, 1844.

— ? ARTICULATA. *Id.* - - - p. 110, pl. 6, fig. 1, *a*, *b*.

Spec. Char. Testâ tenui, orbiculari vel subpentangulari, vix æquilaterali, tumidâ, subobliquâ; striis confertis, articulatis; umbonibus prominulis, approximatis; margine integro.

Shell thin, orbicular, or somewhat of a pentangular outline, scarcely equilateral, tumid, and rather oblique; ornamented with numerous close-set articulated striæ; beaks slightly prominent and close; margin smooth.

Diameter, $1\frac{1}{8}$th of an inch.

Locality. Cor. Crag, Ramsholt, and Sutton.

Red Crag, Sutton. Recent, Corsica and Sicily.

About a dozen specimens of this species in perfect condition have been obtained by myself from the Coralline Crag at Ramsholt: a few with the valves united, and one only from the Red Crag.

Not having been able to obtain a specimen of the recent shell for comparison, its identification is dependent upon the figures and descriptions above referred to, but its outward form and ornamented exterior are so peculiar, that it is assigned to the Mediterranean species without much hesitation.

The hinge of the right valve is furnished with two primary diverging teeth, the posterior one being bifid, while the left valve has three teeth; the centre one of which is large and double, or so deeply cleft, as to give that valve the appearance of having four; there are no distinct lateral teeth, though on the anterior side the lateral edges interlock; it has but an elongated fulcrum for the external ligament; there are no lunule: the two large impressions by the adductors, the anterior one being the smaller and more narrow; the impression by the mantle is large, deep, and rounded, ascending beyond the middle of the shell, and extending over to the anterior side. In outline it much resembles *L. undata*, and also in its very visible but somewhat irregular lines of increase, but it differs in the possession of numerous radiating striæ. The length generally exceeds the height by about an eighth, but in some specimens there is no difference.

Hippagus.* *Isaac Lea*, 1833.

Verticordia. *S. Wood*, MSS., 1842.

Generic Character. "Shell cordate, inflated, without teeth; beaks large, recurved, margin slightly overwrapping beneath the beak: anterior cicatrix long, posterior cicatrix round."

The above is given by Lea in his 'Contributions to Geology,' as the diagnosis of a genus proposed to be established upon a small fossil shell found in the United States, in a Formation of the Older Tertiary Period, and it has been adopted by Philippi, who has included in it a fossil from the Valley of the River Lamati, in Calabria, and as this appears to be identical with our Crag Species, I have followed the latter Author in the generic assignment.

* Etym. *Hippagus*, a horse-ferry boat.

1. HIPPAGUS VERTICORDIUS, *S. Wood*, Tab. XII, fig. 18, *a*, *b*.

CRYPTODON? VERTICORDIA. *S. Wood.* Catalogue, 1840.
VERTICORDIA CARDIIFORMIS. *S. Wood.* MS., 1844.
— — *J. Sowerby.* Min. Conch., t. 639, 1844.
HIPPAGUS ACUTICOSTATUS. *Phil.* En. Moll. Sic., vol. ii, p. 42, t. 14, fig. 19, 1844.

Spec. Char. Testâ suborbiculari vel cordiformi, convexâ, subæquilaterali, tenui, costatâ costis circa 16 *incurvatis, compressis, radiantibus, rugosis; apicibus antrorsùm involutis; margine denticulato.*

Shell suborbicular, or heart-shaped convex, thin, subequilateral, costated, ribs about 16, incurved, radiating, compressed, rugose; apices involute; margin denticulated.

Diameter, $\frac{3}{8}$ths of an inch.

Locality. Coralline Crag, Sutton.

This elegant shell is by no means abundant as a British fossil, and from the figure and description above referred to, there is every reason to believe the same species once inhabited the seas which deposited the Upper Tertiaries of Calabria. A slight difference exists between our shells, as far as can be determined without an inspection of the specimens, but such as does not appear to be more than a local variation, and not sufficient to affect their specific identity.

The Italian fossil has given to it only 13 ribs, while there are 15 to 16 in our shell, but like some species in the genus *Cardium* (which it resembles externally,) this may be a variable character: the ribs are elevated, and laterally compressed, rounded on the top, but not sharp or angular, as Philippi's name would seem to imply, and as his figure represents; they are elegantly curved, and are generally rugose, or coarsely imbricated, and distributed at about equal distances; the concave spaces between them are rather wider than the ribs themselves, and appear to be finely granulated, or studded over with small papillæ. In the interior are the marks of two somewhat large adductor muscles, the anterior one is the more deeply impressed, that by the mantle is indistinct: the ligament or cartilage appears to have been placed so far within the dorsal margin of the shell, that when the valves were closed it was probably not visible, being placed in a depression beneath the margin, extending into a cylindrically formed aperture towards the umbo, and the receding of the ligament, or its desertion on the anterior side, causes a slight involution of the umbones, like that of *Isocardia*, though in a very minor degree. A callous, but prominent and obtuse tooth in the right valve, close to the umbo, fits into a sinus in the left valve: the shell is beautifully nacreous within, and though not particularly thin, the ribs are visibly marked in the interior by deep indentations, and they project considerably beyond the margin, inter-locking and serving the office of prominent denticles.

Cardium,* *Linnæus.*

Pectunculus. *Adanson*, 1757.
Cerastes and Cerastoderma. *Poli*, 1795.
Isocardia, (sp.) *Klein*, 1753.
Cardissa. *Megerle*, 1811.
Aphrodita. *Lea*, 1833.
Lunulacardium. *Münst.*, 1840.
Lævicardium. *Swains*, 1840.
Hemicardium. *Id.*
Acardo. *Id.*
Papyridea. *Id.*
Serripes. *Beck*, sec. *Gould.*
Monodacna (part) and Didacna. *Eichw.*, 1841.

Generic Character. Shell equivalve, sub-equilateral, more or less heart-shaped; generally closed, sometimes gaping posteriorly: usually inflated, orbicular, or ovate, costated, costæ variable, from nearly obsolete to large and prominent, sharp, round and naked, often ornamented with scales or tubercles; margin dentated or crenulated; hinge composed of two cardinal teeth in each valve, and two remote and prominent lateral teeth. Ligament external. Impression of the mantle without a sinus.

Animal of the general form of the shell, its mantle open in front, with the margins generally plain, occasionally fringed, particularly towards the posterior, and around the syphons; these are short, and slightly separated, with the margins of one or both always fringed; foot large, sub-cylindrical, and bent at nearly a right angle, possessing the form of an inflected arm or elbow-joint.

Eichwald has described some species from the Caspian sea, which he has separated into three genera, under the names of *Didacna, Monodacna,* and *Adacna,* depending for his characters upon the numerical presence, or the absence of the hinge-denticles. The animals of the latter division appear deserving of separation, being furnished with elongated syphons, and consequent indenture of the mantle mark. Some fossils also from the Palæozoic rocks, justly erected into a Genus by Professor Phillips under the name *Pleurorhynchus,* much resembled the general character of cockles, but were probably furnished with elongated syphons, as the shell is greatly produced on the posterior side. Species possessing undoubted characters of this Genus, have been obtained from the Middle Secondary Formations, and they are largely developed in the Tertiaries, while from the present seas not less than 200 species have been obtained. Their range geographically takes in nearly the whole surface of the Globe, and they are met with in Estuaries as high as low-water mark, while some are inhabitants of the sea at depths not exceeded by any other Molluscs. They generally frequent sand or sandy-mud bottom, where they often congregate in prodigious numbers.

* Etym. καρδια, the heart.

1. CARDIUM ECHINATUM, *Linnæus*. Tab. XIV, fig. 3 *a—b*.

Bonanni. Recr. Ment. et Ocul., fig. 90, 1684.
Lister. Hist. Conch., lib. iii, fig. 161, 1687.
Dale. Hist. and Antiq. of Harwich, p. 292, t. xii, fig. 6, 1730.
CARDIUM ECHINATUM. *Linn*. Syst. Nat., ed. 12, No. 79, p. 1122, 1767.
— — *Dacosta*. Brit. Conch., p. 176, t. xiv, fig. 2, 1778.
— — *Müller*. Zool. Danica, t. xiii, figs. 1 and 2, and t. xiv, figs. 1—4.
— — *Donovan*. Brit. Shells, t. 107, fig. 1, 1802.
— — *Chemn*. Conch. Cab., vol. vi, p. 165, t. xv, fig. 158.
— — *Brown*. Illust. Brit. Conch., pl. xxi, fig. 6, 1827.
— — ? *Basterot*. Bord. Foss., p. 82, 1825.
— — *Phil*. En. Moll. Sic., vol. i, p. 49, and vol. ii, p. 37.
— — *Forbes*. Ægean Invert. Rep., Brit. Assoc., p. 180, 1843.
— — *Lovén*. Ind. Moll. Scand., p. 35, 1846.
— — *Alder*. Catal. Moll. North. and Durh., p. 83, 1847.
— — *Forbes* and *Hanley*. Hist. Brit. Moll., vol. ii, p. 7, pl. xxxiii, fig. 2, and pl. N, fig. 3, 1849.
— MUCRONATUM. *Poli*. Test. Sicil., vol. i, p. 60, pl. xvii, figs. 4, 5, 1792.
— SPINOSUM. *Sowerby*. Brit. Miscel., t. xxxii.
Encyc. Method., t. 298, fig. 3.

Spec. Char. Testâ orbiculato-cordatâ, convexâ, sub-æquilaterali; anticè rotundatâ, posticè sub-quadratâ; costis 19—20 *convexis, papilliferis, interstitiis concentricè striatis.*

Shell orbicularly heart-shaped, convex, slightly inequilateral, anterior side rounded, posterior angular, or sub-quadrate; ribs 19—20, rounded and papilliform, interstices marked by concentric striæ.

Diameter, 1½ inch.

Localities. Red Crag, Sutton.
Uddevalla.
Recent, Ægean, Mediterranean, Britain, Scandinavia.

A very few specimens only of this shell have as yet come under my observation, and those are such as have not the spines or tubercular ornaments of the ribs in a perfect condition.

The hinge is furnished with strong and prominent teeth, those called lateral are nearly equidistant from the umbo, and there is a somewhat broad and prominent fulcrum for the support of the ligament; the posterior side is truncated or angular; the bend which is at the posterior lateral tooth forms an angle of about 100°, and the lines of the ribs are distinctly visible in the interior. Upon the younger portion of the shell the tubercles are generally gone, and in the fossil that part has lost the outer portion of the shell, consequently its ornament. The spaces between the ribs, which are broad and flat, are nearly as wide as the ribs themselves; they are covered with ridges or elevated lines of growth at nearly regular distances.

The figure by Dale is, I presume, of a specimen of this species, more especially as he refers to Lister's representation of *C. echinatum*, and although in my researches

this species has been very rarely met with, it may possibly have been more abundant in that part of the Crag whence his shells were taken, but now long since washed into the sea.

C. echinatum, Dubois, 'Wolhyn. Pod.,' pl. vi, figs. 13, 14, does not appear from the figure to correspond with our shell.

2. CARDIUM NODOSUM, *Montague*. Tab. XIII, fig. 4 *a—c*.

CARDIUM NODOSUM.		*Mont.* Test. Brit., p. 81, 1803.
—	—	*Turt.* Brit. Biv., p. 186, t. xiii, fig. 8, 1822.
—	—	*Hanley.* Recent Shells. Supp., pl. xvii, fig. 44.
—	—	*Reeve.* Conch. Icon. Cardium, pl. xxii, fig. 128.
—	—	*Lovén.* Ind. Moll. Scandia, p. 36.
—	—	*Alder.* Catal. Moll. North. and Durh., p. 83, 1848.
—	—	*Forbes* and *Hanl.* Hist. Brit. Moll., vol. ii, p. 22, pl. xxxii, fig. 7, 1849.
—	DISCREPANS?	*Brown.* Illust. Brit. Conch., pl. xxii, fig. 9, 1827.
—	SCABRUM.	*Phil.* En. Moll. Sic., vol. ii, p. 38, vol. xiv, p. 16, 1844.
—	—	*Hanley.* Rec. Shells. Supp., pl. xvii, fig. 43.

Spec. Char. Testâ parvâ, ovato-orbiculari, parum convexâ, sub-æquilaterali, anticè rotundatâ, posticè truncatâ; costis circa 26 planulatis, nodulosis; interstitiis punctatis.

Shell small, somewhat orbicular, slightly convex, a little inequilateral, anterior side rounded, posterior truncated; ribs about 26, flattened, and ornamented with tubercles; interstices narrow and punctated.

Length, $\frac{1}{2}$ an inch nearly; *height*, $\frac{3}{8}$ths do.

Locality. Cor. Crag, Sutton.

Red Crag, Sutton, Alderton, Bawdsey.

Recent, Mediterranean, Britain, Scandinavia.

This species is particularly abundant, more especially in the Coralline Crag, at Sutton, where the larger specimens are generally much altered by the loss of all the outer coating of the shell, and with it, of course, its tubercles; but in the younger state it may be obtained plentifully in high perfection, and in some specimens the tubercles are very deciduous, while in others they cover the entire surface. The diameter is in general greater from the anterior to the posterior side, than from the umbo to the ventral margin: it is not so in all. It may be very well distinguished by its contour, which is slightly angular on the hinder side, but less so than in *C. exiguum*. The ribs are very flat and broad, and the interspaces so narrow, that it is only occasionally the ridges or punctated surface of those furrows can be seen. On the anterior and central portion of the shell, the nodules, when remaining, are broad and obtuse, reaching across the ribs, while on the posterior side, the ribs are more convex, and only ornamented in the centre with sharper or smaller tubercles.

3. CARDIUM NODOSULUM, *S. Wood.* Tab. XIII, fig. 3 *a—c.*

CARDIUM NODOSULUM. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ minutâ, subcirculari, parum inæquilaterali, compressiusculâ, tenui; costatâ et nodosâ; costis 30 *convexis, papillosis, brevibus, et obtusis.*

Shell small, subcircular, slightly inequilateral, rather compressed, thin, costated, and nodulous; ribs about 30, convex, and studded with numerous short, obtuse papillæ.

Diameter, $\frac{3}{8}$ths of an inch.

Locality. Red Crag, Sutton.

Two or three specimens only of this shell are in my cabinet.

There are several species to which this shell bears considerable resemblance, but to no one does it appear to accord in all its characters; it must, therefore, remain for the present with the provisional name attached to it in my Catalogue. In form and general outline, it is somewhat like the figure of *C. pinnulatum*, Conrad; but from the description of that shell by Dr. Gould, 'Invert. Massach.,' p. 91, it has only twenty-six ribs, and an angular ridge on the posterior side, with other characters assigned to *nodosum*, corresponding precisely in description to that species, and in like manner differing from ours.

Card. minimum, 'Phil. En. Moll. Sic.,' also resembles it in many characters, but from his description must be distinct, as there appears a great difference in the form of the ribs, for that author speaks of his shell, p. 38, "costis 30—32, *planissimis.*"

Our shell may be more fully described as nearly equilateral, the posterior side a trifle the larger, very slightly convex, or less tumid than the generality of these small species, somewhat rounded on both sides, rather the less so posteriorly; the distinguishing character is in the ribs, which are, at least, 30, not flat, but convex, with a wide space between each, and the centre of these ribs only are covered with short, narrow, obtuse, nodules; those upon each side, more especially on the posterior, are smaller than upon the middle of the shell. The interstices between the ribs are broad, deep, concave, and smooth. *Card. suecicum* has a like number of ribs, but is not smooth between them, is more inequilateral, and has vaulted scales. *Card. papillosum*, Poli, has a less number of ribs, and is otherwise different.

4. CARDIUM STRIGILLIFERUM, *S. Wood.* Tab. XIII, fig. 5 *a—d.*

CARDIUM ELONGATUM. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ minutâ, ovatâ, transversâ, valdè inæquilaterali, tumidâ; costis 24 *elevatis, planiusculis, papilliferis, papillis squamaformibus, sulcis magnis punctatis, vel transversè imbricatis.*

Shell small, ovate, transverse, very inequilateral, tumid, with about twenty-four elevated ribs, flattened on the top, and ornamented with vaulted scales or tubercles; spaces between the ribs wide, with elevated concentric ridges.

Length, $\frac{3}{8}$ths of an inch; *height*, $\frac{2}{8}$ths of an inch.

Locality. Cor. Crag, Sutton.

This elegant species is one of the most abundant shells, though very rarely found with the valves united.

It much resembles the figure of *C. elongatum*, Turt. Judging from that alone, it was imagined to have been the same, and inserted under such name in my Catalogue. The great peculiarity of our shell is the very broad furrow, or intermediate space between the ribs, and the intersecting of these furrows by regular, sharp, elevated ridges at right angles to the ribs. It is very inequilateral, and rather tumid, with a somewhat prominent umbo; the ribs are thickly studded with elevated and vaulted scales, extending about three quarters across the depressed but not quite flattened rib; and when the specimen is in good condition, the entire surface of the rib is covered with these prominent half-tubular spines.

On the posterior portion they are more prominent and sharp, the spaces between the ribs are nearly as broad as the ribs themselves, and filled with the regular ridges, giving it a somewhat cancellated appearance; the ribs are seldom less than twenty-two or more than twenty-four in number, and these are distinctly visible within the shell.

In the very infant state of this species (fig. 5 *c*), the ribs are not more than half in number; after which, an additional one is interposed between each, so that only every other rib terminates or converges to the beak. The margin of the shell is deeply indented by the ribs, more especially on the posterior side, where they project in a somewhat ragged or jagged manner beyond the margin.

5. CARDIUM EDULE, *Linnæus*. Tab. XIV, fig. 2 *a—g*.

Lister. Hist. Conch. pl. 334, fig. 171.
Dale. Hist. and Antiq. of Harwich, p. 293, pl. xii, fig. 5. 1730.
CARDIUM EDULE. *Linn*. Syst. Nat., ed. 12, p. 1124, No. 90, 1767.
— — *Don*. Brit. Shells, vol. iv, t. 124, fig. 1, 1803.
— — *Phil*. En. Moll. Sic., vol. i, p. 52, t. iv, fig. 16.
— — *Lovén*. Ind. Moll. Scand., p. 35, 1846.
— — *Midden*. Malac. Rossic., p. 548, t. xv, figs. 10-22.
— — *Basterot*. Bord. Foss., p. 81, 1825.
— VULGARE. *Dacosta*. Brit. Conch., p. 180, pl. xi, fig. 1.
— — EDULE. *Chemn*. Conch. Cab., t. vi, p. 198, t. xix, fig. 194, 1782.
— PECTINATUM. *Desh*. 2d edit. Lam., t. vi, p. 405.
— ARCUATUM, *Reeve*. Conch. Icon. Cardium, pl. xxii, fig. 133.
— ZONATUM. *Brown*. Illust. Brit. Conch., t. xxii, fig. 8, 1827.
— TENUE. *Id*. „ „ t. xxii, fig. 4.
— CRENULATUM. *Reeve*. Conch. Icon., pl. xx, fig. 112.
— RUSTICUM. *Chemn*. Conch. Cab., t. vi, t. xix, fig. 197.
— — *Eichwald*. Fauna Caspio-Caucasia Nouv. Mem. de la Soc. Imp. des Nat. de Mosc., t. vii, t. xxxvii, figs. 24-27.
— — *Phil*. En. Moll. Sic., vol. i, t. iv, figs. 12-14.
— EDULINUM. *J. Sowerby*. Min. Conch., t. 283, fig. 3, 1821.

CARDIUM EDULINUM. *Nyst.* Coq. Foss. de Belg., p. 193, pl. xv, fig. I, 1843.
— ANGUSTANUM. *Id.* Rech. Coq. Foss. Prov. d'Anv., p. 13, No. 49, 1835.
— OBLIQUUM. *Woodward.* Geol. of Norf., p. 43, pl. ii, fig. 19, 1833.
— CLODIENSE. *Broc.* Coq. Foss. Subap., t. xiii, fig. 3, 1814.
— GLAUCUM. *Brug.* Encyc. Meth., t. i, p. 221, No. 14.
— LAMARCKII. *Reeve.* Conch. Icon. Cardium, pl. xviii, fig. 93.
— BELTICUM. *Id.* „ „ pl. xx, fig. 113.
— EICHWALDII. *Id.* „ „ pl. xix, fig. 94.

Spec. Char. Testâ variabile, plurimùm rotundato-cordatâ, obliquâ, interdùm ovatâ, transversâ, compressiusculâ aut tumidâ, parum inæquilaterali costatâ costis 18—28 *posticè sæpè obsoletis; lineis concentricis elevatis, distantibus, asperis.*

Shell variable, for the most part roundedly heart-shaped, oblique, sometimes transversely ovate, often tumid, occasionally compressed; ribs 18—28, the posterior obsolete; concentrically rugose, with distant, dwarfish imbrications.

Length, 2 inches; *height*, $1\frac{1}{2}$.

Localities. Cor. Crag, Ramsholt (var. *rusticum*).
Red Crag, passim.
Mam. Crag, Bramerton, Thorpe, Chillesford.
Uddevalla.
Recent, Mediterranean, Finmark, Britain, Caspian.

The first indication of the existence of this species is in the Coralline Crag, from which Formation I have only one specimen, and this is of the var. called *rusticum;* its habits, however, in the living condition, are such as to confine it generally to shallow water, and to the proximity of rivers, that its presence at Ramsholt in association with species that are more purely marine, is not, perhaps, to be so much surprised at. In the Red Crag, though not one of the most abundant, it is of common occurrence, but the specimens are sometimes rubbed and worn, as if they had been much disturbed, and probably transported from a distance: this is the state in which that variety called *edulinum* by J. Sowerby, in 'Min. Conch.,' is most often found, and it is the one most common there, and may, perhaps, have been derived from the older Formation, or Coraline Crag. In the Red Crag the variations are very conspicuous; in some the diameter from the anterior to the posterior side greatly exceeds the measurement from the umbo to the ventral margin; in others it is slightly the reverse; and the number of ribs is alike variable; the character most distinguishable is the slope on the posterior side where the ribs are less prominent than upon the other parts of the shell, but this is at times very indistinct, more particularly in that variety called *clodiense* (fig. 2 *e*), which I believe to be only an aberrant form of this species.

6. CARDIUM ANGUSTATUM, *J. Sowerby.* Tab. XIII, fig. 6 *a—c.*

CARDIUM ANGUSTATUM. *J. Sow.* Min. Conch. t. 283, fig. 2, 1821.
— — *Woodward.* Syn. Tab., p. 13, 1830.
— — *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ transversâ, elongato-ovatâ, parùm inæquilaterali; depressiusculâ, tenui; anticè rotundatâ, inflatâ; posticè attenuatâ, compressiusculâ; costis 27—32 *depressis, planulatis, approximatis, asperis; margine ventrali recto vel coarctato.*

Shell transverse, elongato-ovate, slightly inequilateral, somewhat depressed, thin; anterior side rounded, and inflated, posterior attenuated, and compressed; ribs 27—32, depressed, flattened, approximating, roughened; ventral margin straight, or rather contracted.

Length, 1½ inch; *height,* 1 inch.

Localities. Red Crag, Sutton, Bawdsey, Ramsholt, Alderton.

This species is very abundant in one or two localities, and it does not appear to have been as yet met with in any other part of the World than in the Red Crag.

In 'Min. Conch.' above referred to, vol. iii, p. 149, it is stated to be abundant in the Crag of Norfolk, but it is not enumerated amongst the shells from near Norwich by Woodward, nor have I seen a specimen from that Formation. This species may be well determined, although occasionally it presents some difference in outward form, but the posterior side is always more or less attenuated, and the dorsal margin on that side slopes at a considerable angle from the umbo; the line of the ventral margin, also, in that half of the shell, is contracted or drawn inwards, giving it a pointed form, considerably more so than in any variety of the common cockle, from which it also differs in having a greater number of ribs, and these are flatter. The umbo is nearly equidistant from each extremity, but the posterior side is much the smaller; the marks of the ribs are very distinct half way into the interior, and in some very thin specimens they may be seen up to the umbo. Externally they are flat, broad, and striated, with a narrow space between them; they are more distinct on the anterior side and body of the shell, as in *C. edule*, becoming obsolete on the posterior slope, and where the exterior is well preserved, they show a sub-imbricated surface all over. In a part of the cliff by the river side at Ramsholt, I have found this species in situ with the valves united, where they show a very slight gape on the posterior side; the specimens are particularly thin and tender, with generally a loss of a considerable part of the exterior; in these specimens the ligament is well preserved.

7. CARDIUM PARKINSONI, *J. Sowerby*. Tab. XIII, fig. 7 *a—b*.

CARDIUM PARKINSONI.	*J. Sow.*	Min. Conch., t. xlix, 1814.
—	—	*Woodward.* Syn. Table Brit. Foss., p. 43, 1830.
—	—	*Id.* Geol. of Norf., p. 43, t. ii, fig. 18, 1833.
—	—	*Nyst.* Rech. Coq. Foss. Prov. d'Anv., p. 12, No. 48, 1835.
—	—	*Potiez* and *Mich.* Cat. des Moll. de Douai, t. xi, p. 183, 1844.
—	—	*Nyst.* Coq. Foss. de Belg., p. 186, pl. xiv, fig. 2 *a*, *b*, 1844.

Spec. Char. Testâ magnâ, rotundato-ovatâ, vel oblique-cordatâ, convexâ, sub-æquilaterali; anticè rotundatâ, posticè sub-angulatâ; costis 28—32 *planulatis, sub-imbricatis.*

Shell large, roundedly ovate, or obliquely heart-shaped, convex, sub-equilateral; anterior side rounded, posterior sub-angulated; ribs 28—32, rather flattened, and slightly imbricated.

Length, 2¾ inches; *height*, 2½ inches.

Localities. Red Crag, Walton-on-the-Naze, Felixstow, Sutton.
Mam. Crag? Thorpe (*Woodward*).

This handsome shell appears to be restricted to the Red Crag Period, for the specimens recorded by *Woodward* were rare or fragmentary, and may have been accidental introductions, as my Norwich collecting friends do not appear to have met with it in their neighbourhood. At Walton-on-the Naze it may be procured in great abundance, and at that rich deposit the specimens are generally in a fine state of preservation; my largest does not exceed the above dimensions, but fragments indicate its having attained a magnitude of at least three inches in diameter. It somewhat resembles in general appearance *C. Islandicum*, Linn., but differs from that species in the form of its ribs; it also has a resemblance to *C. maculatum*, Gmel., *C. ventricosum*, Brug., from the bay of Campeachy, but is never so large, and seldom of such comparative dimensions, our shell being generally longer than high; it differs from *C. edule* in being less angulated or pointed, but is of a more quadrate form on the posterior side, although specimens in the young state are exceedingly difficult to be distinguished. The ribs are sometimes rounded, but more generally flattened, and are, in the best preserved specimens, distinctly striated, but I have never been able to count so many as forty, the number given as its specific character in 'Min. Conch.,' and seldom more than thirty-one; they are often regularly ornamented with dwarf ridges, or sub-imbrications, crossing the prominent parts, and they are more distant than those upon the common cockle, especially on the anterior side of the shell, where, in some specimens, they are often regular and distinctive; on the posterior side these concentric ridges are coarser and closer together; the dental characters are prominent, resembling those of *edule*, though less strongly developed, with a proportionally smaller ligamental area, and the shell is thinner, in all which characters there is a sufficient difference to entitle this to be considered as specifically distinct.

8. CARDIUM DECORTICATUM, *S. Wood.* Tab. XIV, fig. 1 *a—d.*

CARDIUM DECORTICATUM. *S. Wood.* Catalogue, 1840.
— OBLONGUM. *Nyst.* Coq. Foss. de Belg., p. 187, pl. xiv, fig. 3, 1844.
— FRAGILE? *Broc.* Conch. Foss. Subap., p. 505, t. xiii, fig. 4 *a*, *b*.

Spec. Char. Testâ orbiculato-ovatâ, obliquâ, inæquilaterali, magnâ, tumidâ, costatâ, costis 34—36*; latere postico lævigato, ad latere antico costis evanescentibus.*

Shell roundedly-ovate, oblique, inequilateral, large, somewhat tumid, costated, posterior side smooth, ribs becoming obsolete or evanescent on the anterior side.

Longitudinal diameter, 3 inches; *transverse ditto*, $2\frac{3}{4}$ inches.

Localities. Cor. Crag, Sutton, Ramsholt, Sudbourn, Gedgrave.

This handsome shell is abundant in the Coralline Crag, but it is difficult to obtain in perfection, from its extreme fragility; the specimens appear not only to have lost much of their animal matter, but the exterior of the younger portion of the shell has become eroded or decorticated down to the base of the ribs, leaving only vestiges of where they had been, while the outer or older part of the shell exhibits the true characters of its original ornament.

From the description given by M. Nyst, there is every probability that the Belgian shell is identical with our English Crag fossil, but I believe it is quite distinct from the recent *C. oblongum*, Chemn., and from the Sicilian fossil, as well as from the recent British shell, *C. Norvegicum*, and also from *C. lævigatum*, Linn.; in its much more distinct and rugose ribs, it approaches closely in that character the Sicilian fossil, differing, however, from this latter most essentially in its form.

Card. tenellum, of my Catalogue, is probably the young of this species; it differs somewhat in outline from the adult shell, having a greater diameter from the anterior to the posterior side, and it was in consequence considered distinct; but intermediate ages have been since obtained, by which it is thought a specific relationship may be maintained.

9. CARDIUM INTERRUPTUM, *S. Wood.* Tab. XIV, fig. 4 *a—b.*

Spec. Char. Testâ rotundato-triangulatâ sub-obliquâ, inæquilaterali; costis 35—40 *depressis, interruptis, ad latum posticum nullis; margine ventrali serrato.*

Shell roundedly triangular, slightly oblique, inequilateral; ribs 35—40, depressed and interrupted; posterior side smooth; ventral margin denticulated.

Length, $2\frac{1}{4}$ inches; *height*, 2 inches.

Locality. Red Crag, Sutton.

I have obtained a few specimens only of this species in perfect condition, and these are all of the left valve, but fragments are not particularly rare.

The rays upon the shell are about forty in number, strongly marked by periodical lines of growth, between which the surface is much eroded or decorticated so deep as

almost to have obliterated the radiating ridges. There appear to have been periods in the life of the animal when the margin of the shell was more than ordinarily thickened, as if the process of increase in the shell was delayed or interrupted, after which it proceeded with more slender rays until they were again thickened, or rather strengthened. This fossil strongly resembles a northern form found in the sea of Ochotsck, figured by Middendorff in his 'Russian Malacology,' t. xv, figs. 23—25, described under the name of *C. Californiense*, Desh., but it is, I believe, specifically different, as in that species (according to the figure) the posterior side is much less rounded than in our Crag fossil; the hinge also appears thicker, with a wider fulcrum for the ligament.

10. CARDIUM VENUSTUM, *S. Wood.* Tab. XIII, fig. 2 *a—b.*

Dale. Hist. and Antiq. of Harwich, p. 293, pl. xii, fig. 18, 1730.

Spec. Char. Testâ cordato-ovatâ, obliquâ, inæquilaterali; obsoletè costatâ, costis numerosis depressis; latere postico lævigato.

Shell ovately heartshaped, oblique, inequilateral; obsoletely costated, ribs numerous, depressed; posterior side smooth, naked.

Length, 2 inches; *height*, 2 inches.

Localities. Red Crag, Walton-on-the-Naze, Sutton.

This is one of the rarer shells of the Red Crag. Being unable satisfactorily to assign it to any known species, I am reluctantly obliged to give it a new name. The shell figured by Dale is evidently the same as ours, but I cannot, as he has done, refer it to Lister's figure, which is *C. Norvegicum;* there is a strong general resemblance, but the posterior side is too much rounded to be united with that species, and it was probably a smoother shell than *C. decorticatum* of the Coralline Crag.

11. CARDIUM GROENLANDICUM, *Chemnitz.* Tab. XIII, fig. 1 *a—d.*

CARDIUM GROENLANDICUM. *Chemn.* Conch. Cab., t. vi, p. 202, t. xix, fig. 198, 1782.
— — *Gould.* Invert. Massach., p. 92, 1841.
— — *Möller.* Ind. Moll. Groen., p. 20, 1842.
— — *Dekay.* Nat. Hist. New York Zool., p. 206, pl. xxiii, fig. 250.
— — *Reeve.* Conch. Icon. Card., pl. x, fig. 53.
— — *Middendorff.* Malacozoologia Rossica, (Mém. de l'Acad. Imp. des Sci. St. Petersb.,) p. 557, t. xvi, figs. 6—9, 1849.
— EDENTULA. *Mont.* Test. Brit. Suppl., p. 29, 1808.
— EDENTULUM. *G. Sow.* Genera No. 34, Cardium, fig. 2.
— ANODONTA. *Blainv.* Man. Malac., p. 658, 1825.
— BOREALE. *Reeve.* Conch. Icon., pl. xxii, fig. 131.
MACTRA RADIATA. *Don.* Brit. Shells, vol. v, t. 161, 1803.
APHRODITA COLUMBA. *J. Lea.* Trans. Amer. Phil. Soc., vol. v, p. 110, pl. xviii, fig. 54, 1833.
ACARDO. *Swains.* Treat. Malac., p. 374, 1840.
SERRIPES. *Beck.* Fide Gould.
MONODACNA PROPINQUA? *Eichwald.* Fauna Caspio-Caucasia, p. 275, t. xl, figs. 3, 4, 1841.
? Encyc. Method., t. 300, fig. 7.

Spec. Char. Testâ sub-cordatâ, transversâ, inæquilaterali, tenui, sub-lævigatâ; anticè rotundatâ, posticè productâ et angulatâ; costis radiantibus obsoletis, striis concentricis distantibus, margine integro.

Shell somewhat heartshaped, transverse, inequilateral, thin, and nearly smooth; anterior side rounded, posterior produced and angular; ribs or radiating lines obsolete, concentric striæ distant; ventral margin with a very gentle curve, and free from crenulations.

Length, $2\frac{3}{4}$ inches; *height*, $2\frac{1}{4}$ inches.

Localities. Red Crag, Bawdsey, Sutton.
Mam. Crag, Chillesford.
Recent, Greenland, North America, Nova Zembla.

This species is abundant in the Red Crag at Bawdsey, but is very scarce in collections, from the difficulty of obtaining a perfect specimen, the exterior being always more or less eroded, and the shell becoming very thin and fragile; the same may also be said of those found in the sandy deposit of the Mammaliferous Crag Period at Chillesford.

This species is so well marked that there is no danger of its being confounded with any other, it stands, as it were, upon the very confines of our generic limits, possessing only the rudiments of those characters by which the majority of the shells in this genus are so well distinguished, and which, indeed, are in general so prominently displayed. The costæ, if they may be so called, are, in the recent shell, but faintly visible, and traces of them are left upon the thickened edges or undecomposed portions of the fossil, most distinctly upon the anterior side; the shell has much the aspect of a *mactra*, and its surface is eroded in the same manner as in the generality of the shells of that genus from the Crag. The posterior side of our shell has a squarish outline, being obtusely angular at the extremity of the posterior lateral tooth, while the ventral margin forms with the posterior side an angle not much less than 90°, though in some of the specimens from Chillesford that side is much more pointed. The arrangement of the dental characters are those of a true Cardium, but they are like the costæ, evanescent, as if a corresponding prominence existed between the teeth and ribs: two large, ovate, and deeply-impressed muscle marks are left in my specimens, seemingly compensating in its powerful adductors for the deficiency of dental characters.

Cardium Norvegicum and *Cardium pygmæum* are given in the 'List of Clyde Fossils,' by Mr. Smith of Jordan Hill.

Genus Chama,* *Linn.*, 1758.

Globus (sp.) *Klein*, 1753.
Stola. *Browne*, 1756.
Jatronus. *Adanson*, 1757.
Macrophyllum. *Gevers*, 1766.

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* Etym. χήμη, *Aristot*, a kind of shell fish.

MACROPHYLLA. *Chemn.*, 1784.
PSILOPUS (sp.) *Poli*, 1791.
GRYPHUS. *Humph.*, 1797.
LACINIA. *Id.*
LAZARUS. *Cuvier*, 1800.
ARCINELLA. *Schum.*, 1817.

Gen. Char. Shell thick, strong, and adherent, irregular, rugose or foliated externally, inequivalve, sub-equilateral, with a distant, unequal, somewhat involute umbo. Hinge with one thick, oblique, sub-crenulated, obtuse tooth in one valve, inserted into a corresponding depression in the other. Impressions of the adductor muscles elongato-oval, that by the mantle entire, or without an inflection. Ligament external.

The figure of the animal of one species, as given by *Poli*, has the mantle open in front, with the edges slightly fringed, long, sub-cylindrical, somewhat bent: foot with a projecting heel, and two short and ciliated siphonal tubes, not extending beyond the margin of the shell.

Amongst the recent species of this genus are some whose shells are elegantly ornamented with spines or foliations, while others are rough, and possessed of but little beauty, and the rugose exterior often forms a firm attachment for species of sponge, by which they are occasionally covered.

The animal generally fixes itself by the left valve, though sometimes by the right, and specific distinctions have been formed in consequence, upon the belief that the same species always adheres by the same valve. Recent observations have proved the fallacy of this dependence.

Animals belonging to this Genus are inhabitants of tropical or sub-tropical regions, and are not known in a living state further north than the Mediterranean. It is rather a modern genus, no true species being found in any formation older than the Tertiaries.

1. CHAMA GRYPHOIDES, *Linnæus.* Tab. XV, fig. 8 *a—d.*

CONCHA RUGATA RONDELETII. *Aldrov.* De Test., lib. iii, p. 458, 1623.
GLOBUS UNDATUS. *Klein.* Tent., p. 173, No. 3, t. xii, fig. 81.
CONCHA RUPIUM. *Chemn.* Conch. Cab., t. vii, p. 145, t. li, figs. 510—513.
— GRYPHOIDES. *Gault.* Ind., part v, t. 101, lit. c—e.
CHAMA — *Linn.* Syst. Nat., ed. 12, No. 165, p. 1139, 1767.
— — *Chemn.* Conch. Cab., t. vii, t. li, figs. 510—513, 1787.
— — *Poli.* Test. Utr. Sic., vol. ii, p. 122, t. xxiii, figs. 3, 4, and 20, 1795.
— — *Broc.* Conch. Foss. Subap., p. 519, No. 2, 1814.
— — ? *Basterot.* Bord. Foss., p. 81.
— — *Bronn.* Lethæa Geogn., vol. ii, p. 927, t. xxxviii, fig. 11, 1838.
— — *Phil.* En. Moll. Sic., vol. i, p. 68, vol ii, p. 49.
— — *Savigny.* Egypt., t. xxii, p. 211, pl. xiv, figs. 8, 1—3.
— — *D'Orbigny.* Moll. de. Canar., p. 104, No. 178.

UNIVERSITY OF CALIFORNIA

CHAMA GRYPHINA. *Lam.* Hist. des An. s. Vert., t. vi, p. 97.
— — *Goldf.* Pet. Germ., vol. ii, p. 205, t. 138, fig. 9 *a*—*c*.
— — *Phil.* En. Moll. Sic., vol. i, p. 68, vol. ii, p. 49.
— — *Reeve,* Conch. Icon. Chama, pl. viii, fig. 43.
— SINISTRORSA. *Chemn.* Conch. Cab., vol. ix, p. 145, t. 116, figs. 992-3, 1786.
— — *Broc.* Conch. Foss. Subap., p. 519, No. 3, 1814.
— BICORNIS. *Linn.* Syst. Nat., ed. 12, p. 1139, No. 166, 1767.
— UNICORNIS. *Desh.* 2d ed. Lamarck., t. vi, p. 582, 1835.
— — *Phil.* En. Moll. Sic., vol. i, p. 68, 1836.
— UNICORNARIA. *Lam.* Hist. des An. s. Vert., t. vi, p. 98, 1815.
— CORNUTA. *Chemn.* Conch. Cab., t. vii, p. 150, tab. lii, figs. 519-20.
— LACERNATA. *Desh.* 2d ed. Lam., t. vi, p. 588, 1835.

Spec. Char. Testâ crasssâ, irregulariter orbiculari, imbricatâ, lamellis brevibus, appressis; apice valvulæ inferioris sinistrorsum incurvo.

Shell thick, strong, irregularly orbicular, covered with short, close imbrications, or lamellæ; apex of the lower or adherent valve curving to the left.

Diameter. 2 inches.

Localities. Cor. Crag, Sutton.
Red Crag, Sutton and Newbourn.

Recent, Mediterranean.

This shell, in my cabinet, is very rare from the Coralline Crag, at the period of which deposit it was an undoubted inhabitant of our latitude; a few specimens have been found in the disturbed portion of the Red Crag, but the solidity of the shell would protect it in its possible removal from an older formation. In the few specimens that I possess from the Red Crag, a somewhat greater difference appears to exist between the two valves than is generally observable in *C. gryphoides*, or recent variety, but that is so variable a character in the living shell as to give no warrant for specific difference, depending, as it does, upon its mode of growth, or place of attachment.

The differences observable in *C. gryphina* and *gryphoides* appear to depend entirely upon the mode by which the animal chooses to attach itself, the one by the right valve, while the other is fixed by the left. In some species, as shown by Mr. Broderip, (in the 'Trans. of the Zool. Soc.,') this mode of adherence is wholly eclectic, depending upon the will of the animal, and that it almost as often employs the one valve as the other for that purpose.

In the var. *gryphina* the lower and larger valve, or that which has been the fixed one, is the right, with the umbo taking a spiral or involute direction towards the left hand, and the free valve appears more as an operculum to cover the animal, which principally occupies the lower valve, like the oyster. In *C. gryphoides* this is reversed, the left valve being made the adhering one, has consequently become the larger. Such a character is a less organic change than we find exhibited in the two opposite forms of *Trophon antiquum*, the spire of which, in the recent shell, turns commonly to the

right, while that of the fossil from the Crag, now admitted by all conchologists as only a variety, turns generally to the left. In my first examination of the recent species, there appeared a difference of form in the impressions by the adductors, which, however, further observation proved to be no permanent character; the shape of these muscle marks being considerably modified by the outward form of the shell, and like the oyster, or any other adherent species of the Bivalvia, is more subject to distortion by the position it has chosen to fix itself, than is ever partaken of by those species which are free, and the muscle marks undergo an elongation or contraction, conforming themselves, in that respect, to the varying properties of the shell, and showing that these are no more to be relied upon than are the outward forms of the shells themselves.

CARDITA,* *Bruguière.* 1789.

ANOMALOCARDIA (sp.) *Klein*, 1753.
ACTINOBOLUS. *Klein*, 1753.
LIMNEA et LIMNODERMA (sp.) *Poli*, 1795.
TRAPEZIUM (sp.) *Humph.*, 1797.
BEGUINA. *Bolten*, 1798.
ARCTURUS. *Humph.*, MS.
VENERICARDIA. *Lam.*, 1801.
GLANS. *Megerle*, 1811.
ARCINELLA. *Oken*, 1815.
CARDISSA. *Oken*, 1815.
MYTILICARDIA. *Blainv.*, 1824.
CARDITAMERA. *Conrad*, 1838.
AGARIA. *Gray*, 1840.

Gen. Char. Shell regular, thick, and strong, equivalve, inequilateral, suborbicular or transverse, closed, generally covered with more or less elevated, thick, and distinct costæ; hinge furnished with two teeth, one short, placed near the umbo, the other oblique, sub-marginal, prolonged towards the posterior. Impression of the mantle without a sinus, those by the adductors deeply seated. Ligament external.

Animal of the form of the shell, with the edges of the mantle disunited, and without projecting siphons; foot small and elongated: buccal opening furnished with three or four pairs of tentacles.

Shells constituting this genus are ornamented upon the exterior with ribs radiating or diverging from the umbo, and are more or less elevated, becoming in some species nearly obsolete, and the shells are always thick and strong.

In the recent state, as a Genus, it has an extended geographical range, one species being found on the Coast of Norway, while others inhabit the seas of New Holland, the Indian Ocean, China Seas, shores of Western Africa, and the East Coast of

* Etym. καρδια, the heart.

America; though not numerous in species, they are widely distributed. They are all marine, and probably, from the thickness of their shells, were inhabitants of not very deep water. The animal is said to be occasionally fixed by a byssus, though that is seldom the case, as, generally, the valves are capable of being perfectly closed.

It does not appear to be a very ancient genus, though largely developed in the Tertiaries.

1. CARDITA SENILIS, *Lamarck.* Tab. XV, fig. 1 *a—f.*

VENERICARDIA SENILIS. *Lam.* Ann. du Mus., t. vii, p. 57.
— — *Id.* Hist. des Env. de Par., p. 222.
— — *Desh.* 2d ed. Lam., Hist. des An. s. Vert., t. vi, p. 384, 1835.
— — *Parkinson.* Org. Rem., vol. iii, p. 191, pl. xiii, figs. 15, 17, 1811.
— — *J. Sow.* Min. Conch., t. 258, figs. 1—3, 1820.
— — *Nyst.* Rech. Coq. Foss. d'Anv., p. 11, No. 43, 1835.
— — *Lyell.* Trans. Geol. Soc., 2d ser., vol. v, p. 245, fig. 1, 1836.
— ANTIQUATA. *Leathes'* MS., fide J. Sowerby.
— INTERMEDIA? *Dubois.* Wolh. Podol., p. 61, pl. v. figs. 20-1, 1831.
CARDITA SQUAMULOSA. *Nyst.* Coq. Foss. de Belg., p. 207, pl. xvi, fig. 4 *b*, and fig. 5 *a*, *b*, 1844.
Dale. Hist. and Antiq. of Harw., p. 291, t. xii, fig. 4, 1730.

Spec. Char. Testâ obliquè-cordatâ, inæquilaterali, oblongâ, sub-quadratâ vel orbiculari; compressâ vel turgidâ, crassâ, clausâ; costis 17—20 *magnis, convexis, rugosis, interdùm squamis, elevatis, fornicatis, asperis; lunulâ parvâ, impressâ, dentibus crassis, perpendiculariter striatis.*

Shell obliquely heartshaped, inequilateral, oblong, subquadrate, or orbicular, tumid or compressed, thick, strong, and closed, furnished with 17—20 large, convex, rugose costæ, sometimes ornamented with distant, arched, and elevated squamæ; lunule small, deeply impressed, teeth thick, and striated in a vertical direction.

Largest Diameter, $1\frac{3}{4}$ inches.

Localities. Cor. Crag, Ramsholt, Sutton, Sudbourne, and Gedgrave.
Red Crag, Sutton, Newbourn, Alderton, Bawdsey, Felixstow.

At Gedgrave it may be procured by hundreds, and occasionally with the valves united, when it forms one of our handsomest shells. It appears to have flourished in great profusion during the period of the Coralline Crag; and from the large number of specimens met with in the Red Crag, it may probably have extended its existence into the period of that deposit, although I have not yet found it at Walton-on-the-Naze.*

This is also one of the most variable of the whole class of Bivalves. The shell with this name, as given from the Environs of Paris by Lamarck, is probably an error, at least I have not been able to see an Eocene species with which it could be identified;

* Dale gives it from Harwich, but as a shell of rare occurrence.

the fossil from Angers is, in all probability, the same, as I have no doubt the one figured and described by M. Nyst (*C. squamulosa*) is no more than a variety of this Protean shell. The valves are always very thick and strong, ornamented with rounded radiating ribs; these are covered with more or less rugose lines of growth at all times, and in some well-preserved specimens large and elevated squamæ may be observed at somewhat irregular distances; the spaces between the ribs, upon the centre and anterior part of the shell, are rather narrower than the ribs themselves, more especially on the posterior part, where they are also less elevated. The umbones are slightly involute, and have a small plain space or lunule immediately beneath them. The right valve has one large tooth sloping towards the posterior side, with the rudiments of a small one before it, near the umbo; in the left valve is a large depression for the tooth of the opposite one, and a thin, linear, compressed tooth, nearly parallel to the dorsal margin, with a small triangularly-formed cardinal tooth, that becomes obsolete in some specimens: these elongated teeth are marked with vertical striæ like the lateral teeth in some species of *Mactræ*, *Cyrenæ*, &c.

In those species with a very transverse form of valve, the shell is generally more compressed, and *vice versâ*, in the orbicular varieties it is more tumid; deep impressions are left by the adductors, and the margin of the shell is indented by the elevation of the ribs; a small additional muscle mark is left upon the shell joining the anterior adductor, such as is common to most of the species of *Astarte* and some of the *Veneridæ*, and the ligament was probably strong and powerful, as indicated by the fulcrum, and deeply impressed furrow on the outside.

In all my specimens, notwithstanding its extreme range in variation in regard to form, from that which is truly orbicular and nearly equilateral, to those which are more especially transverse and very inequilateral, they invariably possess the character of being somewhat rounded at the posterior side, and never angulated, like *Ch. antiquata*, Linn. I am not sufficiently acquainted with the Italian fossils to say whether either of the shells figured by *Brocchi* could be united with the Crag shell, but those specimens I have seen appear to differ in being also less rounded on the posterior side, with a slight difference in the form of the ribs, and covered with more prominent scales.

2 CARDITA SCALARIS, *Leathes'* MSS. Tab. XV, fig. 5.

VENERICARDIA SCALARIS.		*J. Sowerby*. Min. Conch., t. 490, fig. 3, 1825.
—	—	*Nyst*. Rech. Coq. Prov. d'Anv., p. 12, No. 47, 1835.
—	—	*Potiez et Mich.* Catal. des Moll. de Douai, p. 166, No. 19, 1844.
CARDITA	—	*Goldf.* Pet. Germ., vol. ii, p. 188, t. 134, fig. 2 *a*, *b*.
—	—	*Nyst*. Coq. Foss. de Belg., p. 213, pl. xvi, fig. 9 *a*, *b*, *d*, 1844.

Spec. Char. Testâ orbiculato-triangulari, depressâ; costis 20—22 *convexis, nodosis; concentricè sulcatis; umbonibus medianis.*

Shell triangularly orbicular, depressed, with 20 to 22 convex, close set nodulous ribs; concentrically sulcated; umbones moderately elevated.

Diameter, ½ an inch.

Localities. Cor. Crag, Sutton, Sudbourn, and Gedgrave.
Red Crag, Sutton, Walton-on-the-Naze.

This species is very abundant in the Coralline Crag at Gedgrave and Sudbourn, and it is by no means scarce in some parts of the Red Crag. The most distinguishing character in this shell is the nodulous form of the ribs, which are placed near together, separated only by a narrow line. The outline of this shell is in general pretty regular, being of a roundly trigonal form, with the umbo turning slightly towards the anterior; occasionally the umbo is more elevated, giving it then a thicker hinge; a small smooth space or lunule is visible, when perfect, on the anterior side, and the elevated ribs produce a deeply crenulated margin.

3. CARDITA ORBICULARIS. *Leathes'* MS. Tab. XV, fig. 4.

VENERICARDIA ORBICULARIS. *J. Sowerby.* Min. Conch., t. 490, fig. 3, 1825.
— — *Potiez et Mich.* Cat. des Moll. de Douai, p. 165, No. 17, 1844.
CARDITA — *Nyst.* Coq. Foss. de Belg., p. 214, pl. xvi, fig. 10 *a*, *b*, *d*, 1844.
— TUBERCULATA. *Goldf.* Pet. Germ., vol. ii, p. 188, t. 134, fig. 3 *a*, *b*.

Spec. Char. Testâ orbiculari, tumidâ, convexâ, crassâ; costis 16—18 *distantibus; concentricè sulcatis.*

Shell orbicular, convex, tumid, and thick; 16 to 18 convex ribs, with a flat space between them; concentrically sulcated.

Diameter, ½ an inch.

Localities. Cor. Crag, Sutton.
Red Crag, Sutton, Newbourn.

This species is also abundant both in the Coralline and in parts of the Red Crag, but I have not seen it from Walton-on-the-Naze. The shell is more orbicular than the preceding, and it is also more tumid; the costæ are different, being narrower and standing apart, having a flat space between them, equal to the breadth of the ribs; the costæ are ornamented with nodules like those of *scalaris*, but are fewer in number; the interstices show the obtuse lines of increase, but they are not elevated like those upon the ribs, and the umbo is rather more curved and less prominent.

4. CARDITA CHAMÆFORMIS, *Leathes'* MS. Tab. XV, fig. 3 *a*—*b*.

VENERICARDIA CHAMÆFORMIS. *J. Sow.* Min. Conch., t. 490, fig. 1, 1825.
— — *Potiez et Mich.* Cat. des Moll. de Douai, p. 162, No. 3, 1844.
CARDITA CHAMÆFORMIS. *Goldf.* Pet. Germ., vol. ii, p. 189, t. 134. fig. 4 *a*, *b*.
— — *Nyst.* Coq. Foss. de Belg., p. 211, pl. xvi, fig. 7 *a*, *b*, *d*, 1844.

Spec. Char. Testâ suborbiculari, convexiusculâ, crassâ; costis 14—16 *convexis, rugosis; natibus prominentibus.*

Shell suborbicular, slightly convex, thick; with 14—16 rugose and convex ribs, umbones rather prominent.

Diameter, $\frac{1}{2}$ an inch.

Localities. Cor. Crag, Sutton.
Red Crag, Sutton, Newbourn.

This shell is not very abundant in my cabinet. It has a more elevated umbo and a less number of ribs than either of the preceding species; the form of the hinge as well as the muscle marks being the same in all, only varying a little in conformity with the varying outline of the shell. The ribs in my specimens are somewhat distant, more rounded, and less nodulous than in *C. scalaris*, less distant than in *C. orbicularis*.

5. CARDITA ANALIS? *Phil.* Tab. XV, fig. 6.

CARDITA ANALIS. *Phil.* Palæont. Beitr., p. 50, t. vii, fig. 6 *a—c.*
(?) — DUNKERI. *Id.* „ „ t. vii, fig. 7, *a—c.*

Spec. Char. Testâ suborbiculari, depressiusculâ, costis circa 20 *convexis, rugosis vel subtuberculatis; natibus prominentibus.*

Shell suborbicular, slightly depressed, with about 20 convex, rugose, or obsoletely tuberculated costæ; umbones prominent.

Diameter, $\frac{5}{8}$ths of an inch.

Locality. Mam. Crag, Bridlington.

This species appears to be peculiar to the more recent Formation at Bridlington, differing in some degree from all my Red or Coralline Crag specimens of this genus, in having the depressed form of rib, and resembling in that character *C. chamæformis*; but they are more numerous, being from 20 to 24 in number, and somewhat nodulous, more especially in the young state; they are not so prominent or distinct, the concentric striæ being more numerous, and not deeply impressed, so as to separate the shell into nodules, and there appears also to be a larger anterior muscle mark, extending more into the shell; my series of this species is not very extensive, and I am unable to say if these characters be permanent.

6. CARDITA CORBIS, *Philippi.* Tab. XV, fig. 2 *a—d.*

CARDITA CORBIS. *Phil.* En. Moll. Sic., vol. i, p. 55, pl. iv, fig. 19, 1836.
— — *Id.* „ vol. ii, p. 41, 1844.
— — *D'Orb.* Moll. de Canar., p. 106, No. 183, 1839.
— — *Nyst.* Add. à la Faune Conch. des Terr. Tert. de Belg.; Bull. Acad. de Brux., t. ix, p. 444, No. 34, 1842.
— — *Nyst.* Coq. Foss. de Belg., p. 216, pl. xi, fig. 9, 1844.
— — *Forbes.* Geol. Survey, vol. i, p. 415, 1846.

CARDITA NUCULINA. *Dujard.* Mém. de la Soc. Géol. de France, t. ii, part ii, p. 265, t. xviii, fig. 13 *a—f*, 1837.

— EXIGUA. *Id.*, p. 265, t. xviii, fig. 17 *a—b*.

MINUTA. *Sacchi.* Catal. Conch. Reg. Neap., p. 4, figs. 5, 6, 1836.

VENERICARDIA CORBIS. *S. Wood.* Catalogue, 1840.

— ANCEPS, var. *Id.*

Spec. Char. Testâ minutâ, ovatâ vel trigonulâ, obliquâ, crassâ; apicibus acutis; striis concentricis, densis, undulatis; sulcis radiantibus, obsoletis.

Shell small, ovate, or subtriangular, oblique, thick and strong; concentric striæ or ridges thick and undulating; radiating sulci obsolete.

Diameter, $\frac{1}{4}$ of an inch.

Localities. Cor. Crag, Sutton.

Red Crag, Walton-on-the Naze.

This is one of the commonest shells in the Coralline Crag at Sutton, and the two valves are often found united. Among the numerous specimens that are in my cabinet, the two forms figured by Dujardin from the Touraine beds may be distinguished. In that variety which has the greatest diameter from the umbo to the ventral margin, (which appears to be the one now living in the Mediterranean, as given by Philippi,) the shell is most ventricose, the umbo most prominent, and the concentric ridges much more elevated and distinct, than those are which have more distinct radiations from the umbo; in the other extreme form of variation which I had called *anceps* (*exigua*, Dujard.), the shell is more compressed, with a greater proportional diameter from the anterior to the posterior side, and the radiating ridges are more visible to the naked eye, and this variety appears to have attained rather larger dimensions, measuring as much as $\frac{5}{16}$ths of an inch. In what may, perhaps, be called the normal form (*Nuculina*, Dujard.), the exterior is covered with concentric ridges at rather unequal distances, and in the young state, or at the umbo, they are very wide apart; they appear to undulate, or are made uneven by the rays which cross them, but the rays fade away so imperceptibly into those in which they are obsolete, that I am unable to draw a line between the two. Our shell possesses one large tooth in the right valve, of a somewhat triangular form, stretching out towards the posterior, and in the other valve there are two teeth, one smaller, immediately beneath the umbo, of a triangular shape, the other compressed and elongated, sloping posteriorly, and nearly parallel to the dorsal margin; the muscle marks are large in comparison with the size of the shell.

Erycinella, *Conrad?* 1845.

Erycina (sp.) *Desh.*, 1825.
Goodallia. *S. Wood.*

Gen. Char. Shell trigonal, equivalve, inequilateral, thick? strong? and closed. Hinge composed of two teeth in each valve, and a triangular space between them. Lateral teeth obscure. Ligament internal. Palleal impression without a sinus.

ANIMAL UNKNOWN.

In 1822 Dr. Turton proposed a Genus of Bivalves under the name of *Goodallia*, with a diagnosis almost in the above words, having an *internal* ligament. The shell constituting the type of his genus, and, indeed, the only one that it contained, is now well known to be a true *Astarte*, and has a ligament placed externally upon a fulcrum; his name, therefore, has lost its claim to be retained.

The figure of a small shell is given by Conrad in his 'Fossils of the Medial Tertiaries of the United States,' corresponding apparently with the above characters, and described under the name of *Erycinella ovalis*, but without a generic diagnosis, and I have adopted it here upon the presumption that he has used it as one that had been fairly established.

The name was no doubt intended as a diminutive of *Erycina*, a genus in which a shell resembling *E. ovalis* has been placed by Deshayes, ('Coq. Foss. des Env. de Par.,' t. i, pl. vi, figs. 23—5.) The genus *Erycina*, as proposed by Lamarck, had included in it by himself an assemblage of heterogeneous materials, making it almost impossible to determine the species intended as the type, in consequence of which it has been pretty generally rejected, although retained by a few continental Conchologists for a group of shells closely related to *Tellina*, possessing *elongated* siphons, a genus to which our present species has no relationship, and the name *Erycinella* is consequently very inappropriate, our shell being evidently connected with *Astarte*.* Preserving, therefore, its close affinity, and retaining it still in the family of the Goddess of Beauty, it has, since its removal from *Goodallia*, remained in my Cabinet under the MS. name of *Astartella*, a name it was intended to have proposed, and to which I would now lay claim, provided no regular diagnosis has previously been given to the one Mr. Conrad has employed.

* There is also a general resemblance, and probably near relationship, with *Cardita*, as one small species of that Genus has the exterior ornamented with concentric instead of radiating ridges, and with a crenulated margin, but the hinge furniture and position of the ligament are quite different.

1. ERYCINELLA OVALIS? *Conrad.* Tab. XV, fig. 10 *a—f.*

ERYCINELLA OVALIS? *Conrad.* Foss. of the Miocene Formation of the United States, p. 74, pl. xlii, fig. 5, 1845.
GOODALLIA? PYGMÆA. *S. Wood.* Catalogue, 1840.
— ? CRENATULA. *Id.*

Spec. Char. Testâ minutâ, obliquâ, ovato-trigonulâ, inæquilaterali, tumidâ, crassâ, concentricè striatâ; posticè rotundatâ, anticè rectiusculâ; cardine bidentato; margine ventrali crenulato.

Shell minute, oblique, ovately triangular, inequilateral, tumid, thick and strong, concentrically striated; posterior side rounded, anterior nearly straight; hinge with two teeth, ventral margin crenulated.

Diameter, $\frac{1}{10}$th of an inch.

Locality. Cor. Crag, Sutton, and Gedgrave.

This little shell is particularly abundant in the Coralline Crag at Sutton; and from its prominent dental apparatus and crenulated margin, the two valves may be often obtained in their natural position, giving thus an opportunity of observing the entire margins of the shell in juxtaposition, without the slightest appearance of any fulcrum or depression into which the ligament could have been inserted, so as to have become visible externally when the valves are closed, the two pieces locking so close together as to be with difficulty separated. The shell is thick and strong, with a prominent obtuse umbo, and the whole exterior, when in perfect condition, is covered with concentric ridges or rounded striæ. The hinge of the right valve consists of two large teeth diverging from the umbo, having a triangular space between them, and a small obscure lateral tooth on both sides; in the left valve there are two large cardinal teeth also diverging, which lock into depressions on the *outside* of the teeth of the right valve; besides these two cardinal teeth in each there are two small denticles in the left, between which and the larger teeth are spaces for the reception of the two large teeth of the right valve, thus leaving in the centre a vacant space immediately beneath the umbo, where it is presumed the ligament was inserted; and in this valve also are two lateral teeth, the one at the extremity of the slope of the anterior margin is prominent, fitting into a corresponding depression in the anterior margin of the right valve, while on the other side it is the reverse, corresponding in this character with the lateral teeth of the small species of *Astarte*, to which it is evidently nearly related. The edge of the margin is deeply denticulated in the adult shell, but in the immature state it is perfectly smooth; the adductor muscles are deeply impressed, large, and of an ovate form, situated near the extremity of the lateral teeth; they are connected by a simple mantlemark, without the least inflection: in the young state the teeth of the hinge are comparatively larger than when full grown, and the margin is then without crenulations; from these, with some other minor differences, it was thought to be a distinct species, but a better examination and more specimens give reason to believe it to be only the immature state.

A small shell from the Paris basin, figured by M. Deshayes, 'Coq. Foss. des Env. de Paris,' tom. i, pl. vi, figs. 22—25, much resembles ours, and I applied to that gentleman for permission to inspect one of his duplicates, and he most obligingly sent over to me, for comparison, the only two specimens he possesses, and for which I beg to express my obligation. I fully concur with him in opinion that his fossil is specifically distinct from the Crag shell: although it would have been desirable to have seen a larger series of the Eocene shell, there is still so much difference between the two, that unless a much greater amount of variation exists in the older Tertiary species than is generally observable, they may very fairly be kept specifically distinct. The Crag shell is much thicker, with a different arrangement of the dental furniture, and there are no well-marked lateral teeth in the French shell; and although the artist of the figure above referred to has given an angular and pointed outline to the base of his shell, with a row of crenulations at the margin, I could not observe either of those characters in the specimens submitted to my examination, nor are they so specially mentioned in the text; it is possible, however, they may be immature specimens, and would consequently have the margins smooth.*

ASTARTE,† *J. Sowerby.* 1816.

VENUS (spec.) *Linn.*
PERONÆA and PERONEODERMA (spec.) *Poli.*
TELLINA (spec.) *Poli.*
MACTRA (spec.) *Mont.*
CYPRINA (spec.) *Turt.*
TRIDONTA. *Schum.*, 1817.
CRASSINA. *Lam.*, 1818.
CYPRICARDIA (sp.) *Id.*
NICANIA. *Leach*, 1819.
GOODALLIA. *Turt.*, 1822.
MACTROIDEA. } *Brown*, 1827.
MACTRINA. }
OREADA. } *Roullier*, 1846.
PUSCHIA. }

* Since the above had gone to press Sir Charles Lyell has returned from America, whence he had kindly undertaken to procure for me, if possible, a specimen of the Transatlantic species for examination, and in a letter received by him from Mr. Conrad the following observation occurs, which I have the permission of Sir Charles to publish.

"I have examined the shell sent by Mr. Wood, and have compared it with the only specimen we have of *Erycinella ovalis*. It is a smaller shell than the latter, of a more ovate form, and proportionally narrower, still, I believe, they constitute one species. Our specimen has radiating lines, as seen through a magnifier, but this may be owing to a weathered surface. I have seen a recent shell from the Gulf of Mexico, which I think is a congener with these fossils, but I have now none to refer to."

† Etym., the Syrian name of Venus.

Gen. Char. Shell thick, strong, and capable of being perfectly closed by the animal; generally more or less inequilateral, with a slightly trigonal form, equivalved, often smooth, sometimes rigid, or deeply furrowed on the exterior; hinge with two diverging cardinal teeth in the left valve, and a trigonal space between them for the reception of a prominent tooth of the same form in the right valve, often striated; generally a lateral tooth on the anterior side beneath the lunule, and sometimes an elevated ridge or tooth inside the dorsal margin on the posterior side; two deep impressions are left upon the shell by the adductor muscles,* and the impression of the mantle is without any inflexion; ligament external.

Animal of the form of the shell; edges of the mantle plain? disunited, except at the posterior, where they form two siphonal openings, with simple orifices, and not extending beyond the shell; foot rather small, strong, and somewhat of an angular shape.

The greater number of the species of this Genus have the inner margin of the shell covered with crenulations, and their presence or absence was for a long time considered a character of sufficient importance for specific distinction, it is now well known that those appearances are not to be depended upon for such a purpose, as in *all* the species of this Genus the immature, or, at least, the young, state of the shell has its margin smooth or free from crenulations, and never, until it has attained to maturity, does it assume that character; and whenever a specimen has its margin crenulated, it may then be considered to have arrived at its full growth.

English authors have generally adopted the above name, while upon the Continent *Crassina* appears to have been more frequently employed; there is no doubt, however, that priority belongs to Mr. Sowerby, and that Lamarck's name is entitled to rank only as third in point of date.

This genus has a considerable vertical range in the living state, but it is more often found in waters of considerable depth, and the greater number of known recent species are inhabitants of the colder regions of the North.

1. ASTARTE TRIANGULARIS, *Montague.* Tab. XVII, fig. 10 *a—d.*

MACTRA TRIANGULARIS. *Mont.* Test. Brit., p. 99, t. iii, fig. 5, 1803.
— MINUTISSIMA. *Id.* Test. Brit. Suppl., p. 37, 1808.
GOODALLIA TRIANGULARIS. *Turt.* Brit. Biv., p. 77, t. vi, fig. 14, 1822.
— MINUTISSIMA. *Id.* „ „ t. vi, fig. 15, 1822.
MACTROIDEA TRIANGULARIS. *Brown.* Illust. Brit. Conch. Syst. Ind., 1827.
MACTRINA TRIANGULARIS. *Id.*, pl. 16, fig. 25.
— MINUTISSIMA. *Id.*, 2d edit., p. 108, pl. xlii, figs. 25, 26.
ASTARTE SUBTRIGONA. *S. Wood.* Catalogue, 1840.

* There is also in most of the species a deeply indented mark near the anterior adductor.

ASTARTE TRIANGULARIS. *Alder*. Catal. North. and Durh., p. 87, 1848.
— — *Jeffreys*. Ann. and Mag. Nat. Hist., vol. viii, p. 166.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. i, p. 467, pl. xxx, figs. 4, 5, 1848.
— LÆVIGATA? *Phil*. En. Moll. Sic., vol. ii, p. 30, 1844.
CRASSINA TRIANGULARIS. *Gray*. Ann. of Philos., 1825.
— MINUTISSIMA. *Id*.
— MINIMA? *Smith*. Mem. Wern. Nat. Hist. Soc., vol. viii, p. 45, 1838.

Spec. Char. Testâ minutâ, obliqua, triangulari, subæquilaterali, lævi, crassâ: posticè convexiore, margine crenulatâ; umbonibus prominentibus.

Shell minute, obliquely triangular, nearly equilateral, smooth, thick, and strong; posterior side the more convex: margin crenulate; umbones prominent.

Diameter, $\frac{1}{8}$th of an inch.

Localities. Cor. Crag, Sutton.
Red Crag, Walton-on-the-Naze.
Clyde Beds.

Recent, Mediterranean? Britain, Hebrides.

This species is very abundant in that rich Depôt of small shells, in the Coralline Crag at Sutton, and from its denticulated margin and prominent hinge teeth, the valves are often found united. There are two different forms or varieties of it, one of which is larger and more compressed, with the posterior side less rounded, corresponding precisely with the recent shell, this is comparatively rare, while the other, (which, from its greater difference in being smaller, longer, that is with a greater comparative diameter from the anterior to the posterior margin, more tumid, and more rounded on the posterior side, was thought to be a different species, and named *subtrigona* in my Catalogue,) may be procured in large numbers. Until lately this shell was regarded as a very rare species in the recent state, and is said now to be more plentiful in the seas of North Britain than in the South, and the difficulty of obtaining a good series for comparison in 1840, induced the belief of its distinction for the Crag shell. The variety *subtrigona*, the common Crag shell, is roundedly triangular, having a diameter quite as large, occasionally even more so when measured from one side to the other, than from the umbo to the ventral margin, but in the other variety it is quite the reverse; the exterior is quite smooth, and the margin of the adult shell is crenulated on the inside, with about two dozen obtuse denticulations. In all cases the young specimens have the margins smooth, but there are others which have attained their full magnitude, with the edge quite free from crenulations; most of my specimens are colourless, but some few have the reddish brown, with which the recent shell is tinged only partially removed, leaving, as it were concentric bands of this colouring matter. The ligament of this species is placed upon a somewhat prominent fulcrum, readily distinguished externally when the valves are united, and not even partially covered by an extension of the dorsal edge.

2. ASTARTE PARVULA, *S. Wood.* Tab. XVII, fig. 11 *a—b.*

ASTARTE PARVULA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ minimâ, obliquâ, ovato-triangulari, inæquilaterali, compressiusculâ, sublævi; posticè latiore: anticè longiore, et productiore; margine integerrimo.

Shell minute, oblique, of a triangularly ovate form, inequilateral, somewhat compressed, nearly smooth; posterior side very short and broad, anterior produced and elongated; margin smooth.

Length, $\frac{1}{9}$th of an inch; *height*, $\frac{1}{10}$th ditto.

Locality. Cor. Crag, Sutton.

This is also an abundant shell at Sutton, but rarely obtained with the valves united. It is a true *Astarte*, and may be distinguished from the preceding, which is the species it most resembles, and for the young of which, without care, it might be mistaken; its differences are principally in outline, this being much more inequilateral, and in place of having the form of an imperfect equilateral triangle, like that of *A. triangularis*, the lines of the margins form with the umbo nearly a right angle; the posterior side is particularly short, with a very gentle curve to the ventral margin, while the anterior is very much produced, sloping in a straight line to within a short distance of the extremity, considerably reducing the breadth, or rather height, of that side; the hinge is furnished with one large triangular tooth in the right valve, as in all the species of the genus, with two in the left, and the prominent marginal or lateral tooth of the right valve, which fits into a corresponding depression in the left, is on the posterior side, while on the anterior side of the umbo, the elevated ridge is in the left valve, and at a considerable distance; the exterior is generally smooth, but in perfect specimens, obsolete, concentric ridges, though not very regular, may be detected.

The shell in its recent state was probably of a reddish-brown colour, like the preceding species, traces of which remain in some specimens, and in others it is also formed into concentric bands. The margin in all my specimens is free from the least appearance of crenulations, as well in those which are the largest, and presumed to be full grown, as in the smaller and consequently younger.

3. ASTARTE BOREALIS, *Chemnitz.* Tab. XVI, fig. 3 *a—d.*

VENUS BOREALIS. *Chem.* Conch. Cab. vii, t. xxxix, fig. 412, 1784.
— COMPRESSA. *Mont.* Test. Brit. Suppl., p. 43, t. xxvi, fig. 1, (large fig.) 1808.
— SULCATA. *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 81, t. ii, fig. 2, 1807.
ASTARTE PLANA. *J. Sow.* Min. Conch., t. 179, fig. 2, 1817, (not Nyst.)
— — *Id.* Geol. Norf., p. 43, t. ii, fig. 14, 1833.
— BOREALIS. *S. Wood,* Catalogue, 1840.
— — *Phil.* Neuer. Conch., vol. ii, p. 58, *Astarte*, pl. i, fig. 11.

ASTARTE BOREALIS. *Forbes.* Mem. Geol. Surv., vol. i, p. 413, 1846.
— COMPRESSA. *Macgill.* Moll. Aberd., p. 261, 1843.
— — *Thorpe.* Brit. Mar. Conch., p. 247, 1844.
— CYPRINOIDES. *Duval.* Révue Zool. Cuv. Soc., p. 278, 1841.
— — *Hanley.* Recent Shells, Suppl., pl. xiv, fig. 40.
— CORRUGATA. *Loven.* Ind. Moll. Scand., p. 37, 1846.
— — *Middendorff.* Mém. de l'Acad. Imp. St. Petersb., p. 562, t. xvii, figs. 4—10, 1849.
— ARCTICA. *Moller.* Ind. Moll. Groenl., p. 19, 1842.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 461, pl. xxx, fig. 7, 1848.
— LACTEA. *Brod.* and *Sow.* Zool. Journ., vol. iv, p. 365, 1829.
— — *Gray.* App. to Beechey's Voy. Zool., p. 152, t. xliv, fig. 19, 1839.
— SEMISULCATA. *Gray.* List Brit. Moll., p. 92, 1851.
CRASSINA ARCTICA. *Gray.* Append. to Parry's Voyage.
— — *Hanley.* Recent Shells, vol. i, p. 88.
— BOREALIS. *Nilson.* Nov. Act. Holm., p. 188, pl. ii, figs. 3, 4, 1822.
— COMPRESSA. *Brown.* Illust. Brit. Conch., pl. xviii, figs. 4, 5, 1827.
— CORRUGATA. *Id.* „ „ pl. xvi, fig. 4 „
— WITHAMI. *Smith* and *Brown.* Mem. Wern. Soc., vol. viii, p. 57, pl. i, figs. 24, 25, 1838.
— SEMISULCATA. *Leach,* in Ross's Voy., Append., p. 175, 1819, (fide Gray.)
TRIDONTA BOREALIS. *Schum.* Essai d'un Nouv. Syst. des Hab. des Vers. Test., p. 146, pl. xvii, fig. 1 *a—b*, 1817.

Spec Char. Testâ crassâ, cordato-trigonâ, inæquilaterali, posticè longiore, subcompressâ, lunulâ elongatâ, profundè excavatâ; margine integerrimo.

Shell thick, somewhat triangularly heartshaped, slightly compressed, inequilateral, posterior side the longer; a deep and elongated lunule; margin smooth.

Length, 1½ inch; *height,* 1¼ inch.

Localities. Mam. Crag, Bramerton, Bridlington.
Clyde Beds, Opslo, Uddevalla.
Recent Arctic Seas, Britain, Nova Zembla, Behring Straits, (*Middendorf.*)

This appears to be comparatively a modern species. In its living state it is decidedly a Boreal shell, although it is occasionally obtained alive in our own seas. As a fossil it is not at all rare in this country, either from Norwich or from the Clyde beds. Like most of the species of this genus, it is subject to considerable variation, not only in its outward form but in the markings of its exterior.

The specimens in my Cabinet from near Norwich, are generally uniform in shape, and when not decomposed, the outside is nearly smooth, with scarcely the appearance of ridges, but in the Bridlington shells, a very material difference is exhibited, even in the few specimens that I possess. The more common form is somewhat rounded, having a height only a little less than the length, but that which has been called *A. Withami* is not only comparatively much longer, but has the posterior side sloped off to a rounded point (fig. 2 *c*, *d*), and this has the umbo covered with distinct ridges extending over a fourth of the exterior, while the one from Norwich is in that part

smooth. In the recent state it is covered with a thick, olivaceous, or dark coloured epidermis, and at the umbones the shell is often eroded; marks of erosion are visible also, more or less, in most of the fossils.* Old specimens are generally thickened within, showing deeply-indented muscle marks. There is a deeply-excavated lunule on the anterior side, and a corresponding slope on the posterior dorsal margin, with a prominent fulcrum for the ligament.

It is said to be obtained in deep water in the British seas, though probably it had an extensive vertical range, being found as a fossil at Bramerton, in association with *Littorina littorea*, *Mytilus edulis*, and others that now inhabit very shallow water; and the fossil specimens are in that good state of preservation to justify the supposition that they had not been transported from any great distance.

4. ASTARTE BASTEROTII, *Lajonkaire*. Tab. XVII, fig. 2 *a—d*.

ASTARTE BASTEROTII. *Lajonk.* Not. Geol. env. d'Anv. (Mém. de la Soc. d'Hist. Nat. de Par.), t. i, p. 129, pl. vi, fig. 3 *a—c*, 1823.
— — *Nyst.* Rech. Coq. Foss. d'Anv., p. 7, No. 26, 1835.
— — *Id.* Coq. Foss. de Belg., p. 151, pl. viii, fig. 4 *a—c*, 1844.
— NITIDA. *J. Sow.* Min. Conch., t. 521, fig. 2, 1826.
— — *S. Wood.* Catalogue, 1840.
CRASSINA NITIDA. *Desh.* 2d edit. Lam., t. vi, p. 258, 1835.
Dale, Hist. and Antiq. of Harwich, t. xi, figs. 12 and 14, 1730.

Spec. Char. Testâ transversâ, ovato-trigonula, sublævigatâ, anticè rotundatâ, posticè, subangulatâ natibus tenui-sulcatis; lunulâ elongato-ovatâ; margine crenulato.

Shell transverse, ovately triangular, nearly smooth, anterior side rounded, posterior subangulated; umbones finely sulcated; lunule elongate and smooth; margin crenulated.

Length, 1$\frac{3}{8}$ths of an inch; *height*, 1$\frac{1}{8}$th ditto.

Localities. Cor. Crag, Sutton, Ramsholt, Sudbourn, Gedgrave.
Red Crag, Sutton, Bawdsey, Felixstow, Walton-on-the-Naze?

The most distinguishing character of this species is a set of fine concentric ridges covering the young shell, and occupying generally less than the fourth part of the diameter of the surface, or a little beyond the umbones of the adult, while all the other part is smooth, or at least with only visible lines of growth.†

The general size of the most common form of the Suffolk shell is an inch in length and $\frac{7}{8}$ths of an inch in height, and it has generally then a crenulated margin, but the other specimen figured (fig. 2 *c*, *d*) measures as much as an inch and $\frac{3}{8}$ths in length, with an edge perfectly smooth; they are all rather compressed, and have a deep, elongated

* A recent specimen in the possession of Mr. Lowry, with the specific name of *lactea* attached, but which I believe to be only a var. of this species, is quite free from ridges about the umbo.

† The ridges upon the umbo of the Belgian shell are somewhat larger than those upon the British specimens, and may be considered a distinct variety.

and smooth lunule, and an elongated corselet on the posterior side; there is an elevated ridge of the dorsal margin in the right valve, and a correspondent furrow on the same side in the left: the anterior lateral tooth or ridge is in the left valve, and the corresponding furrow on that side in the right; there are three teeth in the right valve, one large and two very small, with two large teeth in the left one; the large central triangularly-formed tooth is ridged or roughened on its sides, and the same may be seen in perfect specimens on the inner side of the two diverging teeth of the left valve.

5. ASTARTE INCRASSATA? *Brocchi.* Tab. XVI, fig. 6 *a—b.*

VENUS INCRASSATA. *Broc.* Conch. Foss. Subap., p. 557, t. xiv, fig. 7, 1814.
CRASSINA INCRASSATA. *Desh.* 2d edit. Lam., t. vi, p. 257, 1835.
ASTARTE — *Goldf.* Pet. Germ., vol. ii, p. 194, t. 135, fig. 2 *a, b.*
— — *Phil.* En. Moll. Sic., vol. i, p. 38, vol. ii, p. 29.
— NITIDULA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ crassâ rotundato-triangulari, tumidulâ, subæquilaterali, posticè paullo longiore, lævi, præterquam ad apices; lunulâ ovatâ, profundâ; margine crenulato.

Shell thick, roundedly triangular, slightly inflated, subequilateral, posterior side rather the longer; smooth, except at the umbones; lunule ovate, and deep; margin crenulated.

Diameter, $\frac{3}{4}$ths of an inch.

Localities. Cor. Crag, Sutton, Sudbourn.
Red Crag, Sutton. Recent, Mediterranean?

This species is abundant in the Coralline, and it is occasionally met with in the Red Crag. Although somewhat variable as a British fossil, it is less so than many other species of this genus. It most resembles the shorter varieties of the preceding, but may be distinguished by several characters that appear to be permanent. Our Crag species has its identification in a Sicilian fossil, which is presumed to be the same as *Ast. incrassata,* Phil., and *V. incrassata,* Broc., the former of these two authors speaks of his shell as very variable in its external appearance, some, he says, are almost smooth, whilst others are sulcated almost to the margin; our Crag specimens are generally very regular in that character, and only in the region of the umbones is the shell at all ridged, and these extend only to a short distance, while all the rest of the surface is perfectly smooth. The shell as represented by Brocchi, is free from ridges of any kind, although in the text, p. 557, he says, "natibus transversim rugosis."

The general form of our shell is somewhat angulated or truncated at the posterior side, the umbones turning a little towards the anterior one, over a large and deep lunule, and on the other side is a large lanceolate corselet, within which is a considerable space that was occupied by the ligament; the umbonal region is occupied by numerous small and rounded ridges, and the margin of the adult shell is deeply crenulated.

6. ASTARTE MUTABILIS, *S. Wood.* Tab. XVI, fig. 1 *a—h.*

ASTARTE MUTABILIS. *S. Wood.* Catalogue, 1840.
— PLANATA. *Nyst,* (not Sowerby.) Rech. Coq. Foss. d'Anv., p. 7, No. 23, 1835.
— — *Id.* Coq. Foss. de Belg., p. 151, pl. vii, fig. 6 *a—b,* 1844.

Spec. Char. Testâ transversâ, oblongâ, subcordatâ, crassâ, inæquilaterali, posticè longiore, truncatâ; natibus latè sulcatis; lunulâ profundè excavatâ; lævigatâ; marginibus incrassatis, crenulatis.

Shell transversely oblong, inequilateral, slightly heartshaped, thick and strong; posterior side the longer, and truncated; umbones broadly sulcated; lunule smooth, and deeply excavated; margins thickened and crenulated.

Length, 2 inches; *height,* $1\frac{5}{8}$ths ditto.

Localities. Cor. Crag, Ramsholt, Sudbourn, Gedgrave, Sutton.
Red Crag, Sutton, Alderton, Baldersey.
Mam. Crag, Bridlington, (*Leckenby.*)

This is one of our most changeable species in this variable genus, and the two forms that have been figured are the extremes of variation, fig. *a, b,* being the most constant, may be described as the type of the species. The adult shell is particularly thick and strong, with the muscle marks deeply indented; the posterior one is large and nearly oval, the anterior one is rather less, and more straightened on the inner side, and immediately beneath the anterior lateral tooth is the third small muscular impression; the line of the mantle indicates posteriorly the short siphons of the living animal; externally the shell is nearly smooth, except at the umbones, which are nearly flat in the adult shell, with about a dozen broad and deep furrows; the umbones are generally sharp, curving over a broad and deeply-excavated lunule, with a large and elongated corselet, both of which are quite naked or smooth; in the right valve the cardinal tooth is large and projecting, somewhat rugged at the sides, with the like striations upon the inner surfaces of the two teeth in the left valve; lateral teeth obsolete; the ventral margin is nearly straight, and the posterior side somewhat quadrate. The margin of this species is quite smooth and sharp until it has attained its full size, when it becomes much thickened and deeply crenulated. Numerous specimens of the young shell may be obtained at Sutton, and I have traced them down to less than a line in diameter.

Fig. 1 *e,f* is, I presume, only an aberrant form of this species; it was obtained at Bridlington by Mr. Leckenby, to whom I am indebted for permission to have it figured.

7. ASTARTE OMALII, *Delajonkaire*. Tab. XVII, fig. 1 *a—f*.

ASTARTE OMALII. *Lajonk.* Not. Geol. env. d'Anv. (Mém. de la Soc. d'Hist. Nat. de Par.) tom. i, p. 129, pl. vi, fig. 1 *a—c*, 1823.
— — *Desh.* Ency. Meth. Vers., t. xi, p. 77, No. 2, 1830.
— — *Nyst.* Rech., Coq. Foss. d'Anv., p. 7, No. 24, 1835.
— — *Id.* Coq. foss. de Belg., pl. 152, pl. ix, fig. 2 *a, b, c*, 1844.
— RUGATA. *Lajonk* (not *J. Sowerby*). Loc. cit., tom. i, p. 130, pl. 6, fig. 5 *a—c*, 1823.
— — *Nyst.* Rech. Coq. Foss. d'Anv., p. 7, No. 25, 1835.
— BIPARTITA. *J. Sow.* Min. Conch., t. 521, fig. 3, 1826.
— OBLONGA. *J. Sow.* Min. Conch., t. 521, fig. 4, 1826.
CRASSINA OMALII. *Desh.* 2d edit. Lam., t. vi, p. 258, 1835.
— BIPARTITA. *Id.* ,, ,, t. vi, p. 259, 1835.
ASTARTE. *Lyell.* Manual of Elem. Geol., 3d edit., p. 165, fig. 149, 1850.

Spec. Char. Testâ variabile, interdùm oblongo-ovatâ sæpè trigonali; sublævigatâ aut sulcatâ, tumidâ vel compressâ, plurimùm inæquilaterali, posticè longiore, subangulatâ; lunulâ ovatâ, profundè excavatâ; natibus acutis, semper sulcatis: marginibus crenulatis.

Shell variable, sometimes ovately oblong, often trigonal, smooth or sulcated, tumid or compressed, for the most part inequilateral; posterior side the longer, subangulated; lunule ovate, deeply excavated; umbones sharp, sulcated; margin crenulated.

Length, 1$\frac{3}{8}$ths of an inch; *height*, 1$\frac{1}{8}$th ditto.

Localities. Cor. Crag, Sutton, Ramsholt, Gedgrave.
Red Crag, Sutton.

This shell is exceedingly abundant in all parts of the Coralline Crag. Of all the species of this very variable genus found in the Crag, this is, "*par excellence*," the most perplexing and difficult to determine. There is a fossil found in the Middle and Upper Tertiaries of America in which the variations in form appear even greater than in our Crag shell, as shown by a large suite of specimens in the Cabinet of Sir Charles Lyell, and that geologist, in his Paper upon the "Miocene Tertiary Strata of Maryland, Virginia, and N. and S. Carolina," published in the 'Proceedings of the Geological Society,' 1845, vol. iv, part iii, p. 555, considers *A. vicina*, *A. arata*, *A. cuneiformis*, *A. obruta*, *A. perplana*, of the American authors, to be varieties of *A. undulata*, Say., in which opinion I fully concur; but he further says, "I have some specimens of *A. bipartita* from the Suffolk Crag, which agree perfectly with the American fossil, except that in the latter the sides of the hinge teeth are much more distinctly grooved. A few only of the English specimens exhibit a faint trace of this grooving." In a species so exceedingly variable as this appears to have been in the seas of the Coralline Crag, and in the same, or at least in localities so little removed as those of Suffolk, where they are now found, it is difficult to say what effect localities so far removed as those of South Carolina might have produced upon an animal with such a tendency to variation; there is scarcely a limit to be put to its specific range, and this excessively variable character is perhaps an argument in favour of specific identification.

From the specimens of the American shell, and from the representations that I have seen, I was inclined to consider them distinct from the peculiarly angular extremity of the posterior side.

This species in the adult state has the margin thickened within and roughly crenulated, although in some large specimens this character is not seen. In all specimens the shell in its young state is covered externally with broad and deep furrows, and is much compressed, and it is in the older shell that it becomes so variable; these ridges or furrows are in some limited to a rather small space upon the surface, or what may be called the umbonal region, while in others the surface is covered with them entirely; these latter continue generally much compressed, while those which have the surface, or at least the greater part of it, quite smooth, and comparatively short, are very tumid, the lunule and corselet in that case becoming of course very large; the posterior side is always more or less truncated, and the umbo sharp, often much pointed. The rugæ spoken of by Sir Charles Lyell as so conspicuous upon the teeth, at least on the outside of the large cardinal tooth of the right valve, and the corresponding inside of the two teeth in the left valve of the American shell, are visible enough in well-preserved specimens of the English fossil, but these markings are no good specific character, and may be seen in several other species. I have traced this species down to the young shell, with a diameter little more than the eighth of an inch, when the cardinal tooth extends to the umbo, but as the shell enlarges, these teeth proceed forward, leaving a space between them; the beaks stand up prominent and sharp, but do not touch, and the opening of the valves is carried backwards by a somewhat extended ligament.

8. ASTARTE ELLIPTICA, *Brown*. Tab. XVI, fig. 7.

CRASSINA ELLIPTICA.	*Brown*.	Illust. Brit. Conch., pl. xviii, fig. 3, 1827.
— OVATA.	*Id.*	Edinb. Journ. Nat. and Geogr. Sci., vol. i, p. 12, pl. i, figs. 8, 9.
— —	*Id.*	Illust. Brit. Conch., 2d ed., p. 96, pl. xxxviii, figs. 12, 13.
— DEPRESSA.	*Id.*	,, ,, p. 96, pl. xxxviii, fig. 2.
— SULCATA.	*Nilson*.	Nov. Act. Holm., p. 187, pl. ii, figs. 1, 2, fide *Forb.* and *Hanl.*
— GAIRENSIS.	*Smith*.	Mem. Wern. Soc., vol. viii, p. 42.
ASTARTE ELLIPTICA.	*Macgill*.	Moll. Aberd., p. 259, 1843.
— —	*Alder*.	Catal. Moll. North. and Durh., p. 87, 1848.
— —	*Forb.* and *Hanl.*	Hist. Brit. Moll., vol. i, p. 459, pl. xxx, fig. 8, 1848.
— GAIRENSIS.	*W. Nicol*.	MS.
— —	*Morris*.	Catal. Brit. Foss. p. 79, 1843.
— SEMISULCATA.	*Möller*.	Ind. Moll. Groenl., p. 19, 1842.
— —	*Phil.*	Neuer. Conch., vol. ii, p. 57; *Astarte*, pl. i, fig. 10.
— —	*Lovén*.	Ind. Moll. Scand., p. 37, 1846.

Spec. Char. Testâ transversâ, ellipticâ, inæquilaterali, compressiusculâ; posticè longiore, truncatâ, semisulcatâ; lunulâ profundâ, lanceolato-cordatâ; margine integerrimo.

Shell transverse, elliptical, somewhat compressed, semisulcated, inequilateral; posterior side the longer, and truncated; lunule deep, of an elongated heartshape; margin without crenulations.

Localities. Mam. Crag, Bridlington, Bramerton?
Glacial Beds of Scotland, Ireland, Wales, and North of England, (*Forbes.*)
Uddevalla. Recent, Coast of Scotland, Finmark, and Greenland.

I have seen only one specimen of this species belonging to the Mammaliferous Crag, and that is from the Cabinet of Mr. Bean, who has obligingly permitted me to have it figured, and this appears the oldest Deposit in which it is found; there is no specimen in my Cabinet from the Red Crag that can be fairly referred to this species; it is stated by Messrs. Forbes and Hanley to be particularly abundant in the more recent beds of the glacial or antihuman period. This shell is said never to have its margins crenulated, in which it differs essentially from the elliptical variety of *A. Omalii*.

In the living state it appears confined to the northern portion of our seas, extending into the colder regions of Finmark and Greenland, and is said to have a vertical range of from 10 to 40 fathoms, usually on a muddy bottom.

9. ASTARTE SULCATA, *Dacosta.* Tab. XVI, fig. 5 *a—b.*

PECTUNCULUS SULCATUS. *Dacosta.* Brit. Conch., p. 192, 1778.
VENUS BOREALIS (part). *Chemn.* Conch. Cab., t. vii, p. 26, t. xxxix, fig. 413, 1784.
— SCOTICA. *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 81, t. ii, fig. 3, 1807.
— — *Mont.* Test. Brit. Suppl., p. 44, 1808.
— DANMONIA. *Id.* ,, ,, p. 45, t. xxix, fig. 4, 1808.
— SULCATA. *Id.* Test. Brit., p. 131, 1803.
CRASSINA DANMONIENSIS. *Brown.* Illust. Brit. Conch., pl. xviii, fig. 1, 1827.
— SCOTICA. *Turt.* Brit. Biv., p. 130, pl. xi, figs. 3, 4, 1822.
— SULCATA. *Id.* ,, p. 131, pl. xi, figs. 1, 2, 1822.
CRASSINE CRASSATELLÉE. *Chenu.* Traité Elem., figs. 232, 233.
ASTARTE SCOTICA. *Flem.* Brit. Animals, p. 440, 1828.
— — *Lovén.* Ind. Moll. Scand., p. 36, 1846.
— — *Alder.* Catal. Moll. North. and Durh., p. 87, 1847.
— DANMONIENSIS. *G. Sowerby.* Gen. of Shells, figs. 1—3.
— — *Lovén.* Ind. Moll. Scand., p. 36, 1846.
— — *Middendorff.* Mém. de l'Acad. Imp. de St. Petersb., p. 560, t. xvii, fig. 3, 1849.
— SCOTICA. *Id.*, p. 560, t. xvii, figs. 1 and 2, and t. xvi, figs. 10—12.
— PALLIDA. *Jeffreys.* Conch. Mag., p. 44, 1839.
— SULCATA. *Flem.* Brit. Anim., p. 439.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 452, pl. xxx, figs. 5, 6, pl. M, fig. 5.
— DANMONIÆ. *Alder.* Catal. Moll. North. and Durh., p. 86, 1847.
— OVALIS. *Woodw.* Geol. of Norf., p. 43, t. ii, fig. 15, 1833.
— ANTIQUATA? (Leathes' MSS.) *Id.*, p. 43, t. ii, fig. 16, 1833.
— VULGARIS. *Jeffreys.* Conch. Magaz., p. 44, 1839.

Spec. Char. Testâ ovato-cordatâ, sulcatâ, subæquilaterali, posticè parùm longiore, truncatâ, anticè rotundatâ; margine crenulato, vel lævigato.

Shell ovately heart-shaped, sulcated, nearly equilateral, posterior side a little the onger, anterior rounded; margin crenulated, or smooth.

Length, $\frac{5}{4}$ths of an inch; *height*, $\frac{5}{8}$ths ditto.

Localities. Red Crag, Sutton.
Mam. Crag, Bridlington (*Forbes*), Bramerton.
Clyde Beds. Recent, Britain, Finmark, North America.

As a Crag shell this is very rare; my cabinet contains a few specimens from Suffolk, and several of those are quite young, having the margin free from crenulations; the one figured is, no doubt, of this species, but differs rather from the generality of specimens now found living in the British seas, and resembles the one given by Middendorf, more especially figs. 1—3, the latter figure being probably only the mature state of the former.

10. ASTARTE COMPRESSA, *Montague*. Tab. XVI, fig. 8 *a—c*.

VENUS COMPRESSA. *Mont.* Test. Brit. Suppl., p. 43, t. xxvi, fig. 1, 1808.
— MONTACUTI. *Dillw.* Desc. Cat. Rec. Shells, p. 167, 1817.
— MONTAGUI. *W. Wood.* Ind. Testaceol., p. 34, pl. vii, fig. 19, 1825.
NICANIA BANKSII. *Leach.* Ann. of Phil., vol. xiv, p. 204, 1819.
— STRIATA. *Id.* „ vol. xiv, p. 204, 1819.
CYPRINA COMPRESSA. *Turt.* Brit. Biv., p. 136, pl. xi, figs. 22, 23, 1822.
CRASSINA STRIATA. *Brown.* Illust. Brit. Conch., pl. xviii, fig. 8, 1827.
— OBLIQUA. *Id.* „ „ pl. xviii, fig. 6, 1827.
— CONVEXIUSCULA. *Id.* „ „ pl. xviii, fig. 7, 1827.
— MULTICOSTATA. *Smith* and *Brown.* Mem. Wern. Nat. Hist. Soc., vol. viii, p. 56, pl. i, fig. 20, 1838.
— COMPRESSA. *Thorpe.* Brit. Mar. Conch., pp. 80 and 247, 1844.
— MONTAGUI. *Gray.* Ann. of Phil., 1825, p. 136.
ASTARTE ANGULATA. *Woodward.* Geol. of Norf., p. 43, t. ii, fig. 17, 1832.
— STRIATA. *Brown.* Illust., 2d ed., p. 96, pl. xxxviii, figs. 6, 7, 8.
— — *Möller.* Ind. Moll. Groenl., p. 20, 1842.
— — *Lovén.* Ind. Moll. Scand., p. 37, 1846.
— — *Gray.* Append. to Beech Voy. Zool., p. 152, t. xliv, fig. 9.
— BANKSII. *Id.* „ „ p. 38, t. xliv, fig. 9, 1842.
— — *Möller.* Ind. Moll. Groenl., p. 20, 1842.
— COMPRESSA. *Forb.* and *Hanley.* Hist. Brit. Moll., vol. i, p. 464, pl. 30, figs. 1—3, 1848.
— — *Middendorff.* Mém. de l'Acad. St. Petersb., p. 560, 1849.
— MULTICOSTATA. *Macgill.* Moll. Aberd., p. 260, 1843.
— — *Phil.* Neuer Conchyl., vol. ii, p. 59, pl. i, fig. 8.
— PULCHELLA (*Jonas*) *Phil.* Id. (fide *Middendorf.*)

Spec. Char. Testâ rotundato-trigonâ, subæquilaterali, nonnihil obliquâ, deformi, posticè latiore, sulcatâ, vel densè striatâ, margine dorsali convexiusculo, margine ventrali integerrimo.

Shell roundedly trigonal, slightly inequilateral, often somewhat oblique, and deformed; posterior side the broader or higher; dorsal margin rather rounded; externally sulcated, or covered with numerous rounded ridges; margin smooth.

Diameter, $\frac{3}{4}$ths of an inch.

Localities. Red Crag, Sutton, Alderton, Bawdsey, Walton-on-the-Naze.
Mam. Crag, Bridlington, Bramerton, Thorpe.
Clyde Beds and Uddevalla. Recent, Britain, Scandinavia.

This species is not by any means rare in the Red Crag, but the shell found there is generally that variety which has the lesser number of ridges, although amongst my specimens there is a variation from 30 to nearly 50. In the newer deposits of Bramerton and Bridlington the specimens are often nearly smooth, or have a greater number, and finer striæ, while the shells also are often somewhat deformed, with a greater comparative length, and a more quadrate kind of outline, and the apices are a little eroded.

What may be called the normal form (fig. 8 *a*) is subtrigonal, with a diameter as great from the umbo to the ventral margin as from the anterior to the posterior side, the umbo curving a little towards the anterior; the shell is generally somewhat compressed, and the ridges of the exterior are rounded and smooth, and about as broad as the spaces between them; the hinge is not very broad, and there is a somewhat prominent anterior lateral tooth at the extremity of a large and elongated lunule, and the dorsal margin is generally more or less rounded. The Red Crag furnishes specimens very variable in outline and somewhat deformed, but they are always regularly ridged and sulcated.

The recent specimens do not often exceed half an inch in diameter, and have been obtained in ten as well as in eighty fathoms.

11. ASTARTE CREBRILIRATA, *S. Wood.* Tab. XVI, fig. 2 *a—b.*

Spec. Char. Testâ transversâ, ovato-trigonâ, inæquilaterali, tumidiusculâ, crassâ; posticè longiore, subtruncatâ; striatâ, striis crebris obtusis confertis, lunulâ elongatâ, excavatâ, margine crenulato.

Shell transverse, ovately triangular, or wedge shaped, inequilateral, slightly tumid, thick; posterior side the longer, and truncated, externally striated or ridged; striæ numerous, close, rounded, and obtuse; lunule elongated, deep; margin crenulated.

Length, $\frac{3}{4}$ths of an inch; *height*, $\frac{5}{8}$ths ditto.

Localities. Red Crag, Sutton, Walton-on-the-Naze.

Recent, Arctic Seas.

A few specimens only of what appears to be a distinct species have been obtained by myself from the Red Crag. They correspond very closely, and in such a variable genus as this, may perhaps be considered as identical with a living species in the Cabinets of Messrs. Morris and Lowry, and said by those gentlemen to have been

procured in the Arctic seas. In a comparison with the recent shell, some slight difference may be observed, the Crag one being somewhat compressed, with a rather more elevated umbo; in the two specimens belonging to Mr. Morris, there is a difference, one being less transverse than the other, and the smaller of the two has the margin of the valves deeply crenulated, while in the other it is quite smooth, and in both the umbo is much eroded, thereby considerably reducing its elevation, but in the Crag shell the umbo has not in the least been acted upon in that manner. There is a considerable resemblance with *A. gracilis* which is also found in the Red Crag, but that species is more equilateral, with the sculpture more distinct and elaborate.

12. ASTARTE GRACILIS, *Münster*. Tab. XVII, fig. 3 *a—e*.

ASTARTE GRACILIS. *Münst.* apud *Goldf.* Pet. Germ., vol. ii, p. 194, t. 135, fig. 4 *a—c*.
— PROPINQUA. *Id.* „ vol. ii, p. 194, t. 135, fig. 3 *a—c*.
— GALEOTTI. *Nyst.* Coq. Foss. de Belg., p. 159, pl. vi, fig. 17 *a—c*.
— LIRATA. *Conrad.* Sec. Lyell Proc. Geol. Soc., 1845, p. 555.

Spec. Char. Testâ orbiculato-trigonulâ, ovatâ, transversâ, tumidâ aut compressiusculâ plurimùm subæquilaterali; lineatâ vel sulcatâ, lineis magnis convexis; margine crenulato vel integro.

Shell roundedly trigonal, ovate, transverse, tumid, or compressed, for the most part nearly equilateral, ridged or sulcated externally, with large rounded lines; margin crenulated or smooth.

Diameter, $\frac{3}{4}$ths of an inch.

Localities. Cor. Crag, Sutton, Ramsholt, Sudbourn, and Gedgrave.
Red Crag, Sutton, Bawdsey.

This species is very abundant in the Coralline, while a few specimens only, and those not in very good condition, have been found by myself in the Red Crag. The most common variety is that which corresponds with the figure by Goldfuss; this is very regular in shape, nearly equilateral, longer than high, and covered upon the exterior with about forty or fifty rounded, regularly-formed ridges, wider than the spaces between them upon the body or older part of the shell, while in the younger or in the umbonal region these ridges are somewhat sharp upon the hinder or upper side, or, as it were, obtusely reflected; the same character in regard to the ridges pervades all the varieties, and covers the entire surface, except the lunule and corselet, which are smooth; another form is more trigonal, has a thicker hinge, with a more prominent umbo, and is quite as high as it is long; var. *multilineata*, (fig. 3 *e*,) of which I have only a few specimens, varies in no other character than a greater number of these concentric ridges, amounting in these to as many as 90; the shell is very thick, tumid, and elevated, and is as high as it is long. In the full grown state the shell is crenulated at the margin, and although large specimens are often met with in which this part is quite smooth, these have not, it is presumed, attained to full maturity. It was probably

deeply coloured in its living condition, as in some specimens a tinge of this remains, and in others there are vestiges of coloured bands.

Sir Charles Lyell speaks of a fossil in the Miocene Deposits of America as allied to this species, and a specimen in my Cabinet from Savigny very closely resembles it, and is probably only a variety with the ridges rather larger, and the intermediate spaces broader.

13. ASTARTE INCERTA, *S. Wood.* Tab. XVII, fig. 4.

ASTARTE PLANA. *Nyst.* Coq. Foss. de Belg., p. 161, pl. xi, fig. 2 *a—b*, 1844.

Testâ orbiculato-ovatâ, compressâ, subinæquilaterali, regulariter striatâ; natibus prominulis; lunulâ ovatâ, lævigatâ; margine crenulato.

Shell roundedly ovate, compressed, somewhat inequilateral, regularly striated; umbo slightly prominent; lunule ovate and smooth; margin crenulated.

Length, $\frac{3}{4}$ths of an inch; *height*, $\frac{3}{4}$ths ditto.

Localities. Cor. Crag, Sutton, Gedgrave.

Belgium.

This species is not very abundant in our Crag. As it is perfectly distinct from *A. plana*, of 'Min. Conch.,' to which species the Belgian fossil was referred, and which appears to be the same as the English Crag shell, I have proposed for it a new name; it approaches very near to one of the varieties of *A. gracilis*, but the differences are such as seemingly to justify a removal. It is flatter or more compressed than any of the numerous specimens of that species that I have seen, and is more inequilateral, with a greater height. In the full grown shell, and in good condition, the margin is regularly and deeply crenulated, differing thereby most essentially from *A. plana*, as also in being covered with small and regular ridges. It is stated to be abundant in Belgium, where it has attained to rather larger dimensions.

14. ASTARTE CREBRICOSTATA? *Forbes.* Tab. XVII, fig. 6.

ASTARTE CREBRICOSTATA. *Forbes.* Annals Nat. Hist., vol. xix, p. 98, pl. ix, fig. 4, 1847.
— — *Jeffreys.* Ann. and Mag. of Nat. Hist., vol. xix, p. 314.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 456, pl. xxx, fig. 9, 1848.
— — *Gray.* List of British Mollusca, p. 92, 1851.

Spec. Char. Testâ ovato-trigonâ, compressiusculâ, crassâ, subinæquilaterali, posticè potiùs longiore; concentricè costatâ, costis crebris obtusis, ad posticè evanescentioribus, margine crenulato.

Shell ovately trigonal, slightly compressed, thick, nearly equilateral, posterior side rather the longer, concentrically costated; ribs or ridges numerous, thick and obtuse, obsolete on the posterior part; margins crenulated.

Length, $\frac{1}{8}$ths of an inch: *height*, $\frac{6}{8}$ths ditto.

Locality. Mam. Crag, Bridlington. Recent, Britain.

One specimen only of this species has come under my observation, it was found by Mr. Leckenby, who has obligingly permitted me to have it figured.

If it were in almost any other genus than the present, the differences between this shell and the figure and description given, above referred to, might, perhaps, be sufficient to justify its being considered a new species; but with only a single specimen, I am unwilling to do more than refer it to one already established. Our present shell may be further particularised as having a prominent and sharp umbo curving a little over a lunule, large and deep; the ridges upon the exterior are large, somewhat prominent and rounded, about as wide as the spaces between them, and on the anterior side they extend up to the lunule, and there stop rather abruptly; while on the posterior side, in the young state, they reach to the edge of the corselet, becoming obsolete and nearly smooth down the slope in the older part of the shell; our specimen is more equilateral, less broad posteriorly, and of a more triangular form than the figures above referred to, but in other respects there is so great a resemblance that it may be considered as probably an aberrant form of the above species. The lunule and corselet are smooth, or, at least, show only lines of growth, and the numerous and close set ridges seem to remove it from any specific connection with *A. sulcata*.

A fossil in the Cabinet of Mr. Morris, brought from the mouth of the Varga, 200 miles up the Dwina, by Sir Roderick Murchison, more resembles the figure and description of *crebricostata* in the 'Hist. of Brit. Mollusca.'

15. ASTARTE PYGMÆA, *Münster*. Tab. XVII, fig. 7 *a*—*b*.

ASTARTE PYGMÆA. (*Münst.*) ex *Goldf.* Pet. Germ., vol. ii, p. 195, t. 135, figs. 5, 6 *a*, *b*; (excl. syn.)

— — *S. Wood*. Catalogue, 1840.

Spec. Char. Testâ minutâ, orbiculato-trigonâ, compressiusculâ, equilaterali, umbonibus prominulis; concentricè costatâ, costis crebris, convexis; margine crenato vel integro.

Shell small, roundedly trigonal, somewhat compressed, equilateral; umbones slightly prominent, concentrically costated; ridges thick, numerous, and convex; margin crenulated or smooth.

Diameter, $\frac{1}{6}$th of an inch.

Locality. Cor. Crag, Sutton.

This species is exceedingly abundant at the above locality, but the valves are rarely found united. It appears to correspond with the figure and description by Goldfuss.

Our shell has the posterior dorsal edge somewhat rounded, and the longitudinal diameter generally exceeds the height; the umbo is neither very sharp, nor very

prominent, and the exterior is covered with ridges parallel to the margin, and varying in number from 16 to 25; these are rounded and obtuse, and rather wider than the spaces between them, and in many of my specimens there are the remains of coloured bands. In the adult shell the margin is covered with about 25—30 large crenulations.

Amongst some specimens given to me by Sir Charles Lyell from Touraine, is a single valve of a shell that may probably be referred to this species, but it is not in a sufficiently perfect condition for a fair identification. Amongst a large number of specimens of our Cor. Crag shell, some may be found with the crenulated margin whose diameter does not much exceed half that of others in which such part of the shell is smooth, but the size is no argument against its having attained to a state of maturity.

Astarte Bosquetii, Nyst, 'Coq. Foss. de Belg.,' pl. vi, fig. 16, which that author has doubtingly referred to *A. pygmæa* of Goldfuss, is probably different, and may be the same as *A. circinnaria*, Mich., it is larger and more angular than our species. Some specimens of *A. minuta*, Nyst, brought home by Sir Charles Lyell, are also different, and, I think, cannot be referred to our species; the shell is smaller, more triangular; the exterior is ridged, and it has a smooth margin: neither can it, in my opinion, be referred to our British species, *A. triangularis*, nor to *A. parvula*.

16. ASTARTE BURTINII, *Lajonkaire*. Tab. XVII, fig. 5 *a—d*.

ASTARTE BURTINEA. *Lajonk.* Mém. de la Soc. d'Hist. Nat. de Par., t. i, p. 129, pl. 6 *a—c*, 1823.
— — *Nyst.* Rech. Coq. Foss. Prov. d'Anv., p. 8, No. 38, 1835.
— BURTINII. *Id.* Coq. Foss. de Belg., p. 160, pl. ix, fig. 7 *a*, *b*, 1844.
— OBLIQUATA. *Id.* (not Sowerby.) Id., p. 160, pl. vii, fig. 7.
— PISIFORMIS, var. *β*. *S. Wood.* Catalogue.

Spec. Char. Testâ crassâ, subtrigonulâ, cordiformi, tumidâ, aut compressâ, subinæquilaterali, striatâ vel sulcatâ, striis obliquis ad marginem excurrentibus; umbonibus prominulis; lunulâ magnâ, lævigatâ; margine crenulato.

Shell thick, subtrigonal, heartshaped, tumid or compressed, slightly inequilateral, striated or sulcated; striæ oblique, running out at the margin; umbones a little prominent; lunule large, deep, and smooth; margin crenulated.

Length, $\frac{7}{8}$ths of an inch; *height*, $\frac{6}{8}$ths, nearly

Length of var. *pisiformis*, $\frac{3}{8}$ths ditto; *height*, $\frac{7}{16}$ths ditto.

Localities. Cor. Crag, Sutton, Ramsholt, Sudbourn, and Gedgrave.
Red Crag, Sutton.

Very abundant in the Cor. Crag, but exceedingly scarce in the Red, so much so, that judging from my own collection, it is doubtful if true and genuine specimens have been found in it.

This shell is so excessively variable, and presents such extraordinary differences in character, that when my Catalogue was compiled, the smaller variety was considered as a distinct species, and passed under the MS. name of *pisiformis*, given to it by my friend the late Rev. G. R. Leathes, in consequence of its pea-like form, which this small variety assumes when the two valves are united; a large additional number of specimens since obtained are found to possess intermediate characters, and it is therefore thought necessary to unite the two.

The typical form may be considered as fig. 5*a*, *b*; this is a large shell, inequilateral and somewhat compressed, and slightly angular on the posterior side, and if found alone, would most deservedly be separated from the smaller and more globose variety, as two shells cannot well *appear* more distinct. The smaller variety, or *pisiformis*, has a height greater than its length, and the posterior side is nearly convex; the lunule is large and smooth, and the shape of it is modified by the form of the shell. The exterior is covered with ridges, broad and smooth, having only a narrow line between them; the ridges pass over the shell obliquely, from the edge of the corselet round to the edge of the lunule, and they take their rise on the posterior side, where they are closer and more numerous, running out or disappearing at the margin of the shell, the lines of growth, of course, crossing them at a variable angle; the number of these ridges vary according to the age or size of the specimen, the very minute not possessing more than half a dozen, while seventy may be counted in the larger and full grown individuals.

A specimen from Thorigny, given to me by Sir Charles Lyell, very much resembles our shell, and is probably only a variety.

17. ASTARTE OBLIQUATA, *J. Sowerby*. Tab. XVI, fig. 4 *a—d*.

ASTARTE OBLIQUATA. *J. Sow.* Min. Conch., t. 179, fig. 3, 1817.
— — *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ ovatâ, transversâ, subæquilaterali, compressâ, striatâ, striis obliquis; umbonibus acutis prominulis; lunulâ lanceolatâ; margine crenulato.

Shell ovate, transverse, slightly inequilateral, compressed and striated, striæ oblique; beaks rather sharp, and somewhat prominent; an elongated lunule and margins crenulated in the adult state.

Diameter, 1¼ inch.

Localities. Red Crag, Walton-on-the-Naze, Sutton.

This shell is very abundant at the former locality; I have very rarely met with it at any other.

As far as can be determined by the figures and descriptions of the Belgian authors, it is very doubtful if this species has been found in that part of the world; the shell so called by M. Nyst appears to be only a variety of *A. Burtinii*, the species so common and so variable in the Coralline Crag.

It appears quite distinct from the preceding, in being flatter or more compressed, and the line of hinge much narrower; it is also a thinner shell. The exterior markings are much alike in both species, having somewhat flat ridges with narrow spaces between them; they pass obliquely over the shell from the posterior to the anterior side, some of which run out at the ventral margin, and cut the lines of growth at an acute angle; the hinge is composed of one large triangularly formed tooth in the right valve, with one anterior lateral tooth at the extremity of the lunule; in the left valve are two diverging cardinal teeth, with the triangular space between them, and the more distinct lateral tooth, or that which has on the outside of it a depression for the elevated edge of the opposite valve, is on the posterior side. This has also the small auxiliary muscular impression on the anterior side, and the mantle mark is without the least indentation. In the adult shell the margin is crenulated, while the younger specimens have it quite smooth. The two valves are occasionally found united in the less unmixed portion of the Red Crag Deposit at Walton-on-the-Naze.

18. ASTARTE DIGITARIA, *Linnæus*. Tab. XVII, fig. 8 *a—d*.

TELLINA DIGITARIA. *Linn.* Syst. Nat., edit. 12, p. 1120, No. 71, 1767.
— — *Chemn.* Conch. Cab. vi, p. 126, t. xii, fig. 121, 1782.
LUCINA DIGITALIS. *Lam.* Ann. sans Vert., t. v, p. 544, 1818.
— — ? *Bast.* Bord. Foss., p. 87, 1825.
— — *Phil.* En. Moll. Sic., vol. i, p. 33, t. iii, fig. 19, 1836.
— — *Id.* ,, vol. ii, p. 25, 1844.
— — *Desh.* 2d edit. Lam., t. vi, p. 231, 1835.
— — *Reeve.* Conch. Icon., pl. ii, fig. 65.
— DIGITARIA. *S. Wood.* Catalogue, 1840.
— CURVIRADIATA. *Nyst.* Rech. Coq. Foss. d'Anv., p. 6, pl. i, fig. 20, 1835.
— — *Id.* Coq. Foss. de Belg., p. 137, pl. 6, fig. 12, 1844.
Ency. Method., pl. 292, fig. 5.

Spec. Char. Testâ minutâ; orbiculato-ovatâ subæquilaterali, compressiusculâ; striis obliquis incurvis, umbonibus depressis; dentibus lateralibus distinctis; margine integerrimo.

Shell small, roundedly ovate, nearly equilateral, somewhat compressed, covered with elegantly curved, oblique, impressed striæ; umbones depressed; lateral teeth distinct; margin smooth.

Diameter, $\frac{3}{8}$ths of an inch

Localities. Cor. Crag, Sutton.
Red Crag, Sutton, Walton-on-the-Naze.
Recent, Mediterranean.

Abundant in the Coralline Crag at Sutton, and by no means rare in the more genuine portion of the Red Crag at Walton-on-the-Naze, where I have found the two valves united. The only trifling difference I can detect between the British fossil and

the recent shell is that in the latter the hinge line appears rather thicker; and the same may be said of the Sicilian fossil.

In this shell the sulci or ridges take their rise, and are most numerous, like the two preceding species, on the posterior side, or that on which the ligament is placed, where they are somewhat rugose, and descend or curve in an oblique direction over the exterior or centre of the shell, and are lost or run out at different distances on the ventral margin, most conspicuously so on the anterior portion. These rugosities are regular on the posterior side, radiating in an opposite direction, like those upon the posterior side of *Venus verrucosa*, and are probably produced by the lines of growth cutting the sculpture at an acute angle; they are most distinct upon the Coralline Crag specimens.

There is a considerable variation in the outline of this species, some individuals having a height as great, or greater, than the length, but in general the larger diameter is from the anterior to the posterior margin; there is also a difference in the sculpture, the lines being much closer or more numerous in some than in others, and they are always more distant near the umbo, or on the young shell, and most distinct upon the Red Crag specimens. There are the remains of colour in some of my fossils, like concentric bands.

It was at one time thought there was sufficient difference in this species to entitle it to more than specific distinction, and it remained in my cabinet under the MS. name of *Digitaria vulgaris*, and perhaps when the animal becomes known, it may present characters that are so; but judging from the shell alone, it so strongly resembles some of the more aberrant forms of Astarte, that it seems more advisable it should be placed here, bearing, as it evidently does, a greater relationship to this genus than either to *Tellina* or *Lucina*, to which it has been hitherto referred. Unlike the former, it has the impression of the mantle entire, or without any inflection, and the impressions of the adductors are of an ovate form, the anterior one being rather the longer of the two; but unlike the latter, it wants the ligulate or band-shaped impression so characteristic of that genus. The same obliquity of ridges may be seen upon a small species with the hinge of *Cardita*, a genus probably very closely allied to the present one.

19. ASTARTE EXCURRENS, *S. Wood.* Tab. XVII, fig. 9 *ab.*

Spec. Char. Testâ minimâ, transversâ, ovatâ, subæquilaterali, compressiusculâ, striatâ, striis obliquis utrinque excurrentibus; umbonibus depressis, marginibus denticulatis.

Shell small, transverse, ovate, nearly equilateral, somewhat compressed, covered with striæ that are not parallel to the margin, but run out from each side; umbones depressed; margins denticulated.

Largest diameter, $\frac{1}{6}$th of an inch.

Locality. Cor. Crag, Sutton.

This shell is not by any means rare at the above locality. It differs from the pre-

ceding species (a shell to which it seems nearest related) in several characters, being smaller, and the ridges have an oblique direction, or they are subconcentric, deviating a little from the lines of growth, so that two or three only are lost in the centre of the ventral margin, and in some specimens, more especially in those which are longer than high, this character is less distinct than in those which are more orbicular, or have a greater comparative height, where this running out of the ridges at the margin is most conspicuous. The form of the shell resembles that of *A. digitaria*, but the sculpture is different, and the margin in this, when it has attained full maturity, is furnished with rather large crenulations. In *A. digitaria* the ridges are broader and flatter than in this species, in which they are somewhat rounded. The dental characters are those of a true *Astarte*, having one triangularly-formed cardinal tooth in the right valve and two in the left, while the most conspicuous lateral tooth, or where there is a depression for the elevated edge of the opposite valve, is on the anterior side in the right valve, and on the posterior side in the left; the muscle marks also correspond with the generic character.

Some specimens of this species have also the remains of coloured bands.

20. ASTARTE PARVA, *S. Wood.* Tab. XVII, fig. 12 *ab.*

ASTARTE PARVA. *S. Wood.* Catalogue Mag. Nat. Hist., p. 249, 1840.

Spec. Char. Testâ parvâ, ovatâ, transversâ, valde inæquilaterali, posticè breviore, anticè productâ, rotundatâ; striata, striis obliquis; umbonibus acutis, prominulis; margine integerrimo.

Shell small, ovate, transverse, very inequilateral; posterior side the shorter, anterior much produced and rounded, ornamented with oblique transverse ridges not parallel to the margin; umbones sharp, somewhat prominent, and margin smooth.

Length, $\frac{1}{8}$th of an inch; *height*, a little less.

Localities. Cor. Crag, Sutton.

The sculpture differs materially in the direction the lines take in crossing the exterior from that of the preceding species, which deviate a little from the lines of growth, there being more of them upon the anterior or larger side than there are upon the posterior side, three or four running out at different parts of the margin, so that, counting from the umbo, they number more towards the anterior than on the other side; the ridges are broad and flat, separated by a depressed furrow, much narrower than the ridges, about 12 or 15 on the posterior side, with 15 to 18 upon the anterior, while the umbo or very young shell appears to have been quite smooth. The dental characters are those of true *Astarte*, with one large triangularly-shaped tooth in the right valve, and a distinct, elongated, anterior, lateral tooth at some distance; and in the left valve are two diverging cardinal teeth, with a duplicature or lateral tooth on the posterior margin; there is a somewhat thickened ridge on the posterior side, as in most of the species of this genus, within or behind which is the

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impression of the posterior adductor, and the mantle mark is quite entire. In all my specimens, many of which are presumed to be full grown individuals, the margin is quite smooth, and many specimens are marked with coloured bands. There is no distinct lunule, but an elongated space on the anterior side that is quite smooth, while on the posterior side the lines run up to the margin. It is thin in the young state when the ridges are visible on the inside.

It is very abundant at the above locality, and the valves are often found united.

Isocardia,* *Lamarck.* 1799.

Bucardia. *Lister*, 1687.
Chama (spec.) *Linn.*
Glossus and Glossoderma. *Poli*, 1795.
Trapezium (sp.) *Humphr.*, 1797.
Bucardium. *Megerle*, 1811.
Diceratia? *Oken*, 1815.
Isocardium. *Blainv.*, 1824.

Generic Character. Shell equivalved, inequilateral, heartshaped, tumid, generally thick and strong, sometimes smooth, often furrowed; umbones prominent and involute. Hinge with two cardinal and one lateral tooth in each valve. Ligament external. Impression of the mantle entire, or without a sinus.

The animal of this genus is described by Malacologists as closely resembling that of *Astarte*, with a broad, short, triangularly formed foot, and the siphons not extending beyond the margins of the shell; their orifices are fringed, and the edges of the mantle double.

This genus is said to constitute a connecting link between the families of *Cyprinidæ* and the *Cockles*, and is also closely allied to *Chama* and *Diceras*, particularly in the shell, by the peculiar involution of the umbones and the recession of the ligament, by which, in its increase, the anterior portion is deserted, and its extension formed on the posterior side.

But few species are known in the living state, and at present not a large number of fossils.

1. Isocardia cor, *Linnæus.* Tab. XV, fig. 9 *a—b.*

Bucardia. *Scilla.* De Corp. Mar. Lapid., t. xvi, fig. aa, 1670.
— *Lister.* Hist. Conch., lib. iii, part ii, fig. 111, 1687.
— communis. *Schum.* Essai d'un Nouv. Syst. des Vers. Test., p. 143, pl. xiii, fig. 2 *a*, *b*, 1817.
Cardium humanum. *Linn.* Syst. Nat., ed. 10, No. 82, p. 682, 1766.
Chama cor. *Id.* ,, ed. 12, p. 1137, No. 154, 1767.

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* Etym. *ισος*, like or equal, and *καρδια*.

CHAMA COR. *Poli.* Test. Sic., vol. ii, p. 113, t. xxiii, fig. 1—3, 1795.
— — *Broc.* Conch. Foss. Subap., p. 519, No. 4, 1814.
CARDITA COR. *Brug.* Encyc. Meth. Vers., tom. i, p. 403, No. 1, 1792.
— — *Bosc.* Hist. Nat. des Vers., t. iii, p. 85, pl. xxi, fig. 4.
ISOCARDIA COR. *Lam.* Hist. des An. s. Vert., t. vi, p. 31, 1822.
— — *J. Sow.* Min. Conch. t. 516, fig. 2, 1826.
— — *Goldf.* Pet. Germ., vol. ii, p. 211, pl. 141, fig. 2 *a—c.*
— — *Bronn.* Leth. Geogn., p. 941, pl. xxxviii, fig. 10, 1838.
— — *Phil.* En. Moll. Sic., vol. i, p. 56, and vol. ii, p. 41.
— — *Nyst.* Coq. Foss. de Belg., p. 196, pl. xvi, fig. 1 *a, b, e,* 1844.
— — *Sysmonda.* Syn. Meth. An. Inv. Pied. Foss., p. 18, 1847.
— — *Lovén.* Ind. Moll. Scand., p. 36, 1846.
— GLOBULOSA. *Defrance.* Dict. des Sc. Nat., t. xxiv, p. 180, Atlas, figs. 2, 2 *a.*
— HIBERNICA. *Reeve.* Conch. Icon. Isocard., pl. i, fig. 4.
— VENTRICOSA. *J. Sowerby.* Min. Conch., vol. vi, p. 28.
— LUNULATA. *Nyst.* Rech. Coq. Foss. Prov. d'Anv., p. 13, pl. iii, fig. 53, 1835.
— — *Id.* Coq. Foss. de Belg., p. 189, pl. xv, fig. 2 *a—e,* 1844.
— CRASSA. *Id.* „ „ p. 198, pl. xv, fig. 3 *a—e,* 1844.
— RUSTICA. *Conrad.* Amer. Mioc. Foss., p. 20, pl. xi, fig. 1, 1838.
— FRATERNA. *Say.* Journ. Acad. Nat. Sci., vol. iv, p. 143, pl. xi, fig. 1 *a, b.*
— MARKOEI. *Conrad.* Proc. Nat. Inst., vol. i, p. 193, pl. ii, fig. 1.
— — *Id.* Amer. Mioc. Foss., p. 70, pl. xl, fig. 2, 1845.
GLOSSUS COR. *Gray.* List. Brit. Moll., p. 95, 1851.

Spec. Char. Testâ cordato-globosâ, orbiculari, tumidâ, lævigatâ, valdè inæquilaterali; umbonibus crassis, acutis, involutis et infra subexcavatis; margine ventrali integro, acuto; striis incrementi irregularibus, cardine bidentato.

Shell somewhat orbicular, or globosely heartshaped, tumid, smooth, and very inequilateral; umbones sharp, thick, and involute, beneath which the shell is depressed or subexcavated; ventral margin smooth and sharp, lines of increase irregular; hinge with two cardinal teeth in each valve.

Diameter, 2 inches.

Localities. Cor. Crag, Gedgrave, Ramsholt, Sutton.
Red Crag, Sutton.

Recent, Mediterranean, Britain, Sweden.

This species is by no means abundant even in fragments, either in the Coralline or Red Crag. The specimen figured is from Gedgrave, and seems to resemble the variety now found in the Mediterranean, being smaller and more globose, with the umbones obtuse and very prominent, while the fragments from the Red Crag, as far as they can be determined, seem to approach the form of the variety found in our own seas, in which the shell is broader, with the umbones much depressed; this character constitutes the essential difference; the more tumid variety of the Coralline Crag corresponding with the Mediterranean form, as the conditions under which each existed were probably similar, while the Red Crag shell seems more to have resembled the one now living in the British seas. Our Crag specimens may be said to be smooth, with the exception of the irregular lines of growth; the numerous fine radiating striæ which ornament

the recent shell are scarcely more than skin deep, or penetrate beneath the epidermis, as may be seen at the umbo of the recent shell, which is generally eroded, but by a close inspection, these granulated striæ may be detected even in the fossil state.

In the Campinian beds of Belgium this shell does not appear to have been rare, but to have presented considerable diversity of form, and M. Nyst himself seems to admit, at page 199, the probability of his own three species being modifications or variations of *Isocardia cor*.

According to Knorr, this is called in France *Cœur de Bœuf*, or bullock's-heart, while in Holland it has the name of *Zots-Kappen*, or foolscap.

Genus Cyprina,* *Lamarck*. 1812.

Venus (sp.) *Auct.*
Arctica. *Schum.*, 1817.

Gen. Char. Shell equivalved, inequilateral, more or less orbicular, or obliquely heartshaped; smooth, or covered with irregular lines of growth, and in the recent state invested with an epidermis; umbones sharp, with a slight inclination to curve; the ventral margin smooth. Hinge with strong and prominent cardinal teeth in each valve, and one posterior lateral tooth. Muscle marks large, anterior one deeply impressed. Mantle mark with a small or incipient sinus. Ligament external.

Animal suborbicular, with mantle freely open, and finely serrated at the edges; siphonal tubes very short, and the margins of the openings fringed; foot large and linguiform.

The shells of this genus closely resemble in outward appearance some of the species of Venus, from which they were separated by Lamarck, who thought them of scarcely sufficient importance for generic distinction; there is, however, a marked difference in the impression of the mantle, which in this is without a sinus, denoting the possession in the animal of very short siphons; a large lateral tooth on the posterior margin is another character by which the shell may be distinguished. It appears to be very closely related to *Isocardia*. The species as yet known are all inhabitants of salt water, and in the living state are frequenters of gravelly sand or mud; they are somewhat of a large size, and of considerable solidity, and, as a genus, may perhaps date its existence as far back as the period of the Greensand Formation, continuing, though sparingly, through the Tertiaries to the present day, without numbering many species either in the existing state or in the ancient seas.

* Etym. κυπρις, one of the names of Venus.

1. CYPRINA ISLANDICA. *Linn.* Tab. XVIII, fig. 2 *a—d.*

PECTUNCULUS MAXIMUS. *List.* Hist. Conch., fig. 108, 1685.
— — *Dacosta.* Brit. Conch., p. 183, t. xiv, fig. 5, 1778.
VENUS ISLANDICA. *Linn.* Syst. Nat., ed. 12, p. 1131, No. 124, 1767.
— — *Müll.* Zool. Dan., vol. i, p. 29, pl. xxviii, figs. 1—5, 1776.
— ICELANDICA. *W. Wood.* Ind. Test., pl. vii, fig. 41, 1825.
— MERCENARIA. *Penn.* Brit. Zool., ed. iv, vol. iv, p. 94, pl. liii, fig. 47.
— BUCARDIUM. *Born.* Mus. Cæs. Vind., t. iv, fig. 11, 1780.
— EQUALIS. *J. Sow.* Min. Conch., t. xxi, 1813.
CYPRINA ISLANDICA. Ency. Meth., pl. 301, fig. 1 *a*, *b*, 1789.
— — *Phil.* En. Moll. Sic., vol. ii, p. 31, 1844.
— — *Nyst.* Conch. Foss. de Belg., p. 146, pl. ix, fig. 1, and pl. ii, fig. 1, 1844.
— — *Agass.* Icon. des Coq. Tert., p. 49, t. xiii, figs. 6, 7, 1845.
— — *Dekay.* Nat. Hist. New York Zool., pl. xxvi, figs. 268-9, 1843.
— — *Lovén.* Ind. Moll. Scand., p. 38, 1846.
— ISLANDICOIDES. *Nyst.* Coq. Foss. Prov. d'Anv., p. 9, No. 33, 1835.
— — *Pusch.* Pol. Pal., p. 74, pl. viii, fig. 5 *a—c*, 1837.
— ANGULATA. *Nyst.* Rech. Coq. Foss. d'Anv., p. 9, No. 34, 1835.
— MAXIMA. *S. Wood.* Catalogue, 1840.
— VULGARIS. *G. B. Sow.* Genera of Shells, No. 32, 1824.
— ÆQUALIS. *Phil.* En. Moll. Sic., vol. i, p. 39, t. iv, fig. 4, 1836.
— — *Goldf.* Pet. Germ., p. 236, pl. 148, fig. 5, *a*, *b*.
— — *Agass.* Icon. des Coq. Tert., p. 52, t. xiii, fig. 5, 1845.
ARCTICA VULGARIS. *Schum.* Essai d'un Nouv. Syst. des Habit. des Vers. Test., p. 145, pl. xiii, fig. 3, 1817.

Spec. Char. Testâ magnâ, subcordatâ, transversâ, vel orbiculari, tumidiusculâ; striis aut lineis incrementi tenuibus et irregularibus; umbonibus acutis vix incurvatis; latere postico subangulato.

Shell large, of a subcordate form, sometimes elongate or transverse, at others nearly orbicular, somewhat tumid, covered with fine and irregular lines of growth; beaks sharp, not prominent, scarcely incurved, posterior side slightly angulated.

Diameter, 4½ inches.

Localities. Cor. Crag, Gedgrave, Ramsholt.
Red Crag, Sutton, Bawdsey, Alderton, Felixstow.
Mam. Crag, Bridlington, Southwold, Chillesford.
Uddevalla and Clyde Beds.
Recent, British, Norwegian, and North American Seas.

This is one of the most common and abundant shells of the Coralline Crag, and although perfect specimens are somewhat difficult to obtain in the disturbed portion of the Red Crag, fragments or imperfect specimens are there of no uncommon occurrence, neither is it very rare in the still more recent deposit of the Mammaliferous Crag. It is found living upon our own coasts in various depths of water from five to thirty fathoms, and mostly where the bottom is of sandy mud, but it is considered as

more essentially a species of an Arctic character. From the examination of a large suite of fossil specimens obtained of different ages, I am convinced no specific separation can be made between these fossils and the shells now found living in our own, and in the Arctic seas; the form is a character upon which no dependence can be placed, as in some specimens the diameter in a longitudinal direction is considerably greater than when measured from the umbo to the ventral margin, as may be seen by the specimens that have been figured; while in others it is nearly orbicular, with the height equal or rather exceeding that of its length; as a general rule it may perhaps be said that the umbo of the Cor. Crag shell is thicker and more prominent than it is in the living species, but even in this there is considerable variation amongst my fossils, and in the shells of the more modern deposits this is less distinguishable.

This shell is said to attain in the living state to the large dimensions of five and a half inches in length, but I have never seen a Crag specimen of such magnitude; mine range from $4\frac{1}{2}$ inches, down to very little more than $\frac{1}{8}$th of an inch.

2. CYPRINA RUSTICA, *J. Sowerby*. Tab. XVIII, fig. 1 *a—e*.

VENUS RUSTICA. *J. Sow.* Min. Conch., t. 196, 1818.
CYPRINA TUMIDA. *Nyst.* Rech. Coq. Foss. d'Anv., p. 9, pl. ii, fig. 32, 1835.
— — *Potiez* and *Mich.* Cat. de Moll. de Douai, t. ii, p. 221.
— — *Nyst.* Coq. Foss. de Belg., p. 148, pl. x, fig. 1 *a*, *a*, *b*, *b*, and pl. viii, figs. 2, 3, and 4, 1844.
— RUSTICA. *S. Wood.* Catalogue, 1840.
— LAJONKAIRII. *Goldf.* Pet. Germ., vol. ii, p. 237, t. 148, fig. 9 *a—c*, 1841.
— DEFRANCII. *Van Beneden.* Bull. Zool. de Guerin, 1835, p. 149, fide *Nyst.*

Spec. Char. Testâ tumidâ, globoso-cordatâ, valdè inæquilaterali; latere postico subquadrato; subtilissimè punctato-striatâ; umbonibus approximatis, subincurvis; lunulâ cordatâ, profundâ.

Shell tumid, globosely heartshaped, very inequilateral; posterior side subquadrate; covered externally with fine, radiating, and punctated striæ; umbones approximate, slightly incurved; lunule heartshaped and deep.

Length, $2\frac{3}{4}$ inches; *height*, $2\frac{1}{4}$ inches; *depth*, $2\frac{1}{4}$ inches.

Localities. Cor. Crag, Sudbourn, Gedgrave, Ramsholt.
Red Crag, Sutton, Newbourn.

This species is less abundant than the preceding one, although in the Coralline Crag at Gedgrave it is not of rare occurrence; from the Red Crag I have only been able to obtain a couple of specimens. The Belgian shell, which I believe to be the same species, is stated by M. Nyst to be very abundant in several localities.

This being undoubtedly the *Venus rustica* of Sowerby, I have retained his name as having a priority of date, and this author appears to have been the first to notice the species. The right valve has two cardinal teeth, the anterior one is of a triangular form, the posterior one is elongated and sharp, they fit into depressions of the same form between

three principal teeth in the left valve, with one distant, angular, and somewhat prominent lateral tooth in each; fulcrum for the ligament long and prominent, and in the old specimens of this species may be seen the oblong cavity before the ligament, while in the younger shell the fulcrum extends nearly to the umbo. The surface is covered with rather prominent and distinct lines of growth, and there are fine, radiating, and punctated striæ, but they are not always visible even with a lens, and were probably, like those upon *Isocardia cor*, most distinct in the epidermis. It is very variable in its outward form, some specimens being transverse and very inequilateral, while others are very orbicular, with a height rather exceeding the length; outwardly it so much resembles *Isocardia cor* as evidently to denote a close relationship.

Circe.* *Schum.*, 1817.

Venus (sp.) *Mont.*
Cyprina (sp.) *Turt.*
Cytherea (sp.) *Phil.*

Gen. Char. Shell equivalve, subtrigonal, orbicular or ovate, thick, strong, and closed; umbones sharp, not much elevated; lunule distinct, margins smooth. Hinge with three primary teeth in each valve, and one anterior lateral tooth. Ligament external; palleal impression with a very small sinus.

Animal suborbicular, with its mantle open, and the margins denticulated; two short siphonal tubes, with fringed orifices; foot large and tongue-shaped.

The authors of the 'History of British Mollusca' have adopted Schumacher's genus for the living homologue of our Crag species, although with some doubt respecting the propriety of the reference. The main features of distinction are the short or sessile appearance of the syphons, which correspond in that respect with those of *Cyprina* and *Astarte*, and they have placed it between those genera; the dentition of our only species resembles that of *Cytherea*, and if it does not strictly belong to the latter genus, deserves a situation but little removed from it.

1. Circe minima. *Montague.* Tab. XIX, fig. 2 *a—d.*

Venus minima. *Mont.* Test. Brit., p. 121, t. iii, fig. 3, 1803.
— triangularis. *Mont.* Test. Brit., p. 577, t. xvii, fig. 3, 1803.
— Cyrilli. *Scacchi.* 1832, fide *Philippi.*
— pumila? *Desh.* 2d edit. Lam., tom. vi, p. 370, 1835, No. 86.
Cyprina minima. *Turt.* Brit. Biv., p. 137, 1822.
— — *Thorpe.* Brit. Mar. Conch., p. 82, fig. 102, 1844.

* Etym., proper name.

CYPRINA TRIANGULARIS. *Turt.* Brit. Biv., p. 136, pl. ii, figs. 19, 20, 1822.
CYTHEREA MINIMA. *Brown.* Brit. Conch. Illust., pl. xix, fig. 3, 1827.
— MINUTA. *Id.* ,, ,, pl. xix, fig. 4, 1827.
— TRIANGULARIS. *Macgil.* Moll. Aberd., p. 268, 1843.
— TRIGONA. *Nyst.* Coq. Foss. de Belg., p. 172, pl. xii, fig. 4, 1844.
— APICALIS. *Phil.* En. Moll. Sic., vol. i, p. 40, pl. iv, fig. 5, 1836.
— — *Forbes.* Ægean Invert. Rep. Brit. Assoc., p. 182, 1843.
— CYRILLI. *Phil.* En. Moll. Sic., vol. ii, p. 32, 1844.
— PUSILLA. *Bonelli* fide *Sismonda.*
— LENTICULA. *S. Wood.* Catalogue, 1840.
EXOLETA ORBICULATA? JUV. *Brown.* Brit. Conch. Illust., pl. xx, figs. 19, 20, 1827.
CIRCE TRIANGULARIS. *King.* Ann. Nat. Hist., vol. xv, p. 112.
— MINIMA. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 446, pl. xxvi, figs. 4, 5, 6, 8, and Animal, Pl. M, fig. 3, 1848.
CRASSINA MINIMA. *Gray.* Ann. of Philos., 1825.

Spec. Char. Testâ parvâ, ovato-rotundatâ vel subtrigonâ, subæquilaterali, compressâ, transversim striatâ, striis lævibus, convexis; lunulâ distinctâ; margine integerrimo.

Shell small, roundedly ovate, or of a subtrigonal form, nearly equilateral, compressed, transversely striated, striæ rounded and smooth; lunule distinct; margin smooth.

Diameter, $\frac{3}{8}$ths of an inch.

Localities. Cor. Crag, Sutton.
Red Crag, Sutton.
Recent, Ægean, Mediterranean, Britain, Zetland.

This species, in the Coralline Crag, is very abundant; my cabinet contains only two individuals from the Red Crag. In outward form it presents considerable variation, some specimens having a longitudinal diameter much greater than its height, while in others the height exceeds the length; the prominence in the umbo of some individuals gives rather an angularity to the upper part of the shell, but there is no distinct triangular variety.

CORALLIOPHAGA.* *De Blainv.*, 1824.

CYPRICARDIA (sp.) *Lamarck.*
VENERUPIS (sp.) *Basterot.*

Gen. Char. Shell transversely ovate or oblong, equivalved, inequilateral, closed; rugged or smooth externally; hinge furnished with two teeth in each valve, or two diverging in one valve, with one triangular and interlocking in the other. Two ovate muscular impressions; mantle mark with small indented sinus. Ligament external.

* Etym. κοράλλιον, coral, and φαγω, to eat.

Animal.

This appears to be distinguished by its dental formula having no lateral teeth like those in *Cypricardia*. What has hitherto constituted the genus *Venerupis*, is a greater number of cardinal hinge teeth, being three in a parallel direction, whereas in this there are only two diverging widely from the umbo. It appears to be closely related to the Venus family, but at present little is known respecting the few species that have as yet been noticed.

1. Coralliophaga cyprinoides. *S. Wood.* Tab. XV, fig. 7 *a—d.*

Coralliophaga cyprinoides. *S. Wood.* Catal. of Crag Shells, in Ann. and Mag. of Nat. Hist., 1840, p. 250.

Spec. Char. Testâ ovato-oblongâ, transversâ, valdè inæquilaterali, nitidâ, lævigatâ; anticè breviore, rotundatâ; posticè subtruncatâ; cardine bidentato divergente, sinu palliari minime profundo.

Shell ovately oblong, transverse, very inequilateral, naked, smooth, closed; anterior side the shorter, and rounded; posterior somewhat truncate; hinge with two diverging teeth, and a small palleal sinus.

Length, $\frac{6}{8}$ths of an inch; *height,* $\frac{1}{2}$ an inch.

Localities. Cor. Crag, Ramsholt, and Sutton.

This species does not appear to have been at all abundant. Var. *a* (fig. *b*, *c*), found within the walls of a Balanus, represents the right valve, which is very elongated, thin, and fragile; this is particularly inequilateral, rounded on the anterior side, somewhat quadrate posteriorly; the exterior is nearly smooth, or with merely irregular lines of growth, and it is rather more tumid on the posterior side, with a sort of obtuse diagonal ridge running from the umbo to the posterior part of the ventral margin; the hinge in this valve has a ledge or fulcrum for the ligament, within which is an elongated tooth nearly parallel, and behind the umbo, with a compressed one diverging under the anterior margin; in the left valve are also two teeth, one of which is of an obtusely triangular form, and seems to have been inserted between the two of the opposite valve, while the other fitted into the depression outside the anterior tooth of the right valve. Var. β (fig. *a*) is comparatively much shorter and thicker, and was found loose in the sand; the hinge area in this is broader and thicker; the marks of the adductor muscles are large and somewhat deeply impressed, and that by the mantle has but a very small indentation; the length of the larger specimen is as one and a half to its height, whereas the smaller variety is scarcely longer than it is high.

Venerupis striatula of Nyst, 'Coq. Foss. de Belg.,' p. 100, pl. iv, fig. 11 *a*, *b*, very much resembles our shell, but it has a large and deeply-indented sinus in the mantle-mark, and the shell to which he has referred his species has also the same distinguishing character.

Petricola coralliophaga, Desh., 'Coq. Foss. des Env. de Par.,' resembles one form of our variable shell, but from description the dental apparatus appears different. An individual, apparently of this genus, is in the cabinet of my friend Mr. F. Edwards, and found at Barton, but it is in so deplorable a condition that no fair comparison can be instituted.

TAPES.* *Megerle*, 1811.

VENUS (sp.) *Linn.*
CALLISTA, CALLISTODERMA (sp.) *Poli*, 1791.
TAPES. *Schum.*, 1817.
PULLASTRA. *G. B. Sow.*, 1827.
VENERUPIS (sp.) *Flem.*, 1828.
SAXIDOMUS? *Conrad*, 1837.

Gen. Char. Shell equivalve, transversely oblong, ovate, or subtriangular, inequilateral, closed, and generally somewhat thick and strong; posterior side the larger; externally smooth, striated, or decussated; inner margin free from crenulations. Hinge composed of three sub-parallel cardinal teeth, two of which are bifid. Palleal sinus large and deep. Ligament external.

Animal of an oblong form, having the mantle freely open in front; the margins plain, or sometimes fringed with fine filaments; siphons sometimes separated to their bases, at others united for half their length, with their orifices bordered by cirrhi; foot lanceolate and thick, furnished with a byssal groove.

This is an extensive genus, and species that may be referred to it have been obtained from the seas of all climates, some of which are extremely elegant, and in the recent state are beautifully ornamented. Many fossils from the older rocks, strongly resembling in form the recent genus, and possessing a mantle mark indicative of the possession of siphonal tubes, have been considered as entitled to a generic association; the distinctive characters, a byssal groove in the foot of the animal, of course is in the fossil perfectly useless, but the shell also possesses a good distinction in the peculiar arrangement of the hinge denticles; this, however, is another character seldom of much service in the older fossils, and it is only when we come into the Tertiaries that we are quite sure of its existence, and in the oldest of these it is doubtfully present.

1. TAPES VIRGINEA, . Tab. XX, fig. 1 *a—e.*

VENUS VIRGINEA. *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 89 t. ii, fig. 8, 1807.
— — *Turt.* Brit. Biv., p. 156, pl. 8, fig. 8, 1822.
— LÆTA. *Poli.* Test. Utrusq. Sic., t. xxi, fig. 1.
— RHOMBOIDES. *Penn.* Brit. Zool., vol. iv, p.9 7, pl. lv, (fig. right hand.)
— SARNIENSIS. *Turt.* Brit. Biv., p. 153, pl. x, fig. 6, 1822.

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* Etym. ταπης, tapestry, probably so called from the ornamental exterior of most of the species.

VENUS VIRAGO. *Lovén.* Ind. Moll. Scand., p. 40, 1846.
CAPSA VIRGO. "*Leach.*" Ann. Mag. Nat. Hist., vol. xx, p. 272.
CUNEUS FASCIATUS. *Dacosta.* Brit. Conch., p. 204, 1778.
VENERUPIS VIRGINEA. *Fleming.* Brit. Animals, p. 452, 1828.
— SARNIENSIS. *Id.* ,, p. 452.
PULLASTRA VIRGINEA. *S. Wood.* Catalogue, 1840.
— — *Forbes.* Rep. Ægean. Invert., p. 180, 1843.
TAPES VIRGINEA. *Forbes* and *Hanl.* Hist. Brit. Moll., vol. i, p. 388, pl. xxv, figs. 4, 6, 1848.

Spec. Char. Testâ ovatâ, compressiusculâ, inæquilaterali, posticè majore et longiore, subangulatâ; concentricè inæqualiter striatâ, striis versùs posticum majoribus; lunulâ lanceolatâ.

Shell ovate, somewhat compressed, inequilateral, posterior side the larger and longer, subangulated, ornamented with concentric striæ or ridges, and these are larger or broader on the posterior side; lunule elongated.

Length, 1½ inch; *height*, 1 inch.

Localities. Cor. Crag, Sutton.
Red Crag, Sutton, Walton-on-the-Naze.
Mam. Crag, Bramerton.
Uddevalla.
Recent, Norway, Britain, Mediterranean.

From the Coralline Crag my specimens are few and fragmentary; in the Red Crag it was not abundant; specimens, however, are in my cabinet sufficiently numerous and perfect to justify its being considered a fair identification, and I feel no hesitation in placing the Crag shell under the name of *virginea;* it appeared also to have continued through the more recent period of the Mam. Crag, as a specimen of this species was obligingly sent to me for description by Mr. Wigham, who found it in the neighbourhood of Norwich, and it is also enumerated among the shells from the Clyde beds. In the living state it is one of our most abundant as well as one of our handsomest species; and although our largest Crag specimen does not measure more than an inch and a half in length, the recent shell attains a magnitude of two and a half inches, a size exceeding those found in the Mediterranean.

2. TAPES AUREA, *Gmelin.* Tab. XX, fig. 2 *a—b.*

VENUS AUREA. *Gmel.* Syst. Nat., p. 3288, 1788.
— — *Mat.* and *Rack.* Linn. Trans., vol. viii, p. 90, pl. ii, fig. 9, 1807.
— — *Turt.* Brit. Biv., p. 155, pl. ix, figs. 7, 8, 1822.
— — *Phil.* En. Moll. Sic., vol. i, p. 47, vol. ii, p. 35.
— — *Lovén.* Ind. Moll. Scand., p. 40, 1846.
— — *Middendorff.* Malac. Ross., p. 569, 1849.
— ÆNEA. *Turt.* Brit. Biv., p. 152, pl. x, fig. 7, 1822.
— NITENS. *Id.* ,, p. 152, pl. x, fig. 8, 1822.
— NEBULOSA. *Solander.* Pult. Dorset., p. 34.

VENUS LITERATA. *Linn.* Faun Suec. non Syst. Nat.
CAPSA CROCEA. "*Leach.*" Mag. Nat. Hist., vol. xx, p. 272.
PULLASTRA AUREA. *Alder.* Catal. Moll. North. and Durh., p. 86.
TAPES AUREA. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 392, pl. xxv, fig. 5, 1848.

Spec. Char. Testâ ovatâ, sub-cordatâ, tumidiusculâ, sub-inæquilaterali, posticè angulatâ; margine ventrali arcuato; concentricè sulcatâ; striis radiantibus obsoletis; lunulâ cordato-ovatâ.

Shell ovate or heart-shaped, slightly tumid, inequilateral, posterior side angulated; ventral margin convex, concentrically sulcated, with obsolete radiating striæ; an elongated but not well-defined lunule.

Length, 1⅛th of an inch; *height*, ⅞ths ditto.

Localities. Mam. Crag, Bramerton.
Uddevalla.
Recent, Norway, Britain, Mediterranean.

The Mammaliferous Crag is its earliest appearance; one specimen only is all that I have seen, and that was found by Mr. Wigham, near Norwich, who has obligingly permitted me to have it figured. In the recent state this is a common species in the British seas upon the Eastern Coast, where it is subject to considerable variation, both in regard to form as well as in the external ornament, some specimens being, in fact, smooth, while others are deeply sulcated, or covered with regular ridges over the entire surface. The striæ upon the exterior of our solitary fossil specimen are fine and numerous; the anterior and posterior sides are somewhat compressed, while there is a tumidity about the middle of the shell differing therein from the preceding species, from which it also differs in being less elongated and rather less inequilateral.

3. TAPES PEROVALIS, *S. Wood.* Tab. XIX, fig. 7 *a—d.*

PULLASTRA PEROVALIS. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ elongato-ovatâ, inæquilaterali, tumidâ, nitidâ, politâ, tenui; anticè rotundato-angulatâ; margine dorsali postico convexiusculo.

Shell elongately ovate, inequilateral, tumid, smooth, glossy, and thin; anterior side roundedly pointed; dorsal margin slightly convex.

Length, 2 inches; *height*, 1¼ inch.

Locality. Cor. Crag, Ramsholt.

I have obtained at the above locality about a dozen specimens of this species, which from loss of animal matter had become excessively fragile.

In many of its characters it strongly resembles *Venus geographica*, but the smooth surface or total absence of the transverse ridges, as well as the radiating or decussating striæ which ornament that species, will readily distinguish it. A shell figured and described by Phillippi from the Neapolitan seas, *V. nitens*, En. Moll. Sic., vol. ii, p. 35, t. xiv, fig. 14, seems to approach even nearer, and may probably be identified

when the specimens can be compared; there are, however, some differences in the descriptions: it is therefore thought best to retain its present name. As this latter species appears its nearest relative, it may be only necessary to point out what are the distinctions, relying upon the description by that author, who, in comparing his shell with the *geographica*, seems to think a specific character exists in being less equilateral, and in the straight dorsal line of *nitens*, with a more convex ventral margin. Our shell, on the contrary, appears to have its dorsal margin more rounded than that of *geographica*, and much resembles in outline the *virginea*, but the smooth and glossy exterior differs from all that I have seen, with the exception of *nitens*; the dental characters appear the same, the central one bifid in the left valve, with two sub-bifid in the right; but the palleal scar, according to the figure, goes deeper into his shell than it does into our Crag fossil.

4. TAPES TEXTURATA? *Lamarck.* Tab. XX, fig. 3 *a—c.*

VENUS TEXTURATA. *Lam.* Hist. des An. sans Vert., 2d ed., p. 355, No. 43.
TAPES TEXTURATA. *G. Sowerby.* Thesaur. Conch. Tapes, No. 39.

Spec. Char. Testâ tenui, cordato-ovatâ, compressiusculâ, inæquilaterali; transversim striatâ, striis numerosis, confertis.

Shell thin, ovately heartshaped, somewhat compressed, inequilateral; transversely striated, striæ numerous, close set.

Length, 1¼ inch.

Locality. Red Crag, Walton-on-the Naze.

The specimen figured is the right valve with three teeth diverging from immediately beneath the umbo. The lines which cover the exterior are generally parallel to the margin of the shell, but they occasionally anastomose, or run into each other like those upon the recent species, *T. texturata.* There is, however, a slight difference in form from that shell, and the lunule is not so distinctly marked; but having only one specimen, and that imperfect, I am unwilling to do more than assign it provisionally to what appears at least its nearest relative; should, however, future examination of better specimens justify a specific distinction, I would claim for the Crag fossil the name of *habilis.*

VENERUPIS.* *Lamarck*, 1818.

VENUS (sp.) *Linn.*
DONAX (sp.) *Id.*
CUNEUS (sp.) *Dacosta.*
IRUS. *Oken*, 1815.
PETRICOLA (sp.) *Turt.*, 1822.
PETRIFORA. *Latr.*, 1827.
VENERIRUPIS. *Blainv.*, 1825, *G. Sow.*, 1839.
VENERUPES. *Swains.*, 1840.

* Etym., Venus, and rupis, a rock.

Gen. Char. Shell ovate or oblong, equivalved, inequilateral, somewhat compressed. Hinge composed of three cardinal teeth in one valve, and two or three in the other. Muscular impressions ovate, with a deep palleal sinus. Ligament external.

Animal oblong; the mantle closed all round with the exception of a small opening in front for the passage of the compressed and lanceolate foot; siphons unequal, disunited at about half their length; extremities ornamented with a double row of fringes.

The arrangement of dental characters in what constitutes this genus, as well as the general form of the shell, approach so closely to those of *Tapes*, that it seems more entitled to a position amongst the Venus family than to any other, and so far as the form of the foot of the animal or its siphons may determine its connections, it does not any further justify a removal; its habits certainly resemble those of *Saxicava*, but the selection as a habitat in holes, formed in rocks, is not peculiar to one family, as Bivalves of very different forms have been found located in such situations: and habits alone are not sufficient for the uniting into one family those Bivalves which possess them; perhaps, after all, this genus as it now stands will be found to possess no sufficient claims for a separate position, and may probably be hereafter united with *Tapes*.

As a genus it contains but very few species, and little is at present known respecting its exotic allies in the recent state, and nothing in the fossil of an older date than the Upper or Middle Tertiaries.

1. Venerupis irus. *Linnæus.* Tab. XIX, fig. 6 *a*, *b*.

Donax Irus. *Linn.* Syst. Nat., ed. 12, p. 1128, No. 111, 1767.
— — *Poli.* Test. Sicil., vol. i, t. x, figs. 1, 2, and vol. ii, p. 83, t. xix, figs. 25, 26, 1795.
Cuneus foliatus. *Dacosta.* Brit. Conch., p. 204, pl. xv, fig. 6, 1778.
Tellina Cornubiensis. *Penn.* Brit. Zool., ed. 4, vol. iv, p. 75, No. 35.
Venus Irus. *Brown.* Illust. Brit. Conch., pl. xx, fig. 9, 1827.
— rupestris? *Broc.* Conch. Foss. Subap., p. 559, t. xiv, fig. 1, 1814.
Venerupis Irus. *Lam.* An. sans Vert., t. v, p. 507, 1818.
— — *Payr.* Catal. Moll. Cors., p. 35, 1826.
— — *Phil.* En. Moll. Sic., vol. i, p. 21, vol. ii, p. 20.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 156, pl. vii, figs. 1—3, and pl. G, fig. 2.
— — *Midden.* Malac. Rossic., p. 567.
Petricola Irus. *Turt.* Brit. Biv., p. 26, t. ii, fig. 14, 1822.
— rupestris? *Dubois.* Coq. Foss. Wolh. Pod., pl. vii, figs. 3, 4, 1831.
Pullastra Irus. *Brown.* Illust. Brit. Conch., 2d ed., pl. 37, fig. 9.
Capsa Irus. "*Leach*, 1818." Ann. and Mag. Nat. Hist., vol. xx, p. 272.
? Encyc. Method., pl. 262, fig. 4.

Spec. Char. Testâ ovato-oblongâ, vel subtrapezoidea, crassâ; posticè longiore et latiore, subangulatâ; lamellatâ, lamellis transversis, interstitiis radianter striatis; dentibus tribus in utraque valvâ; sinu palliari magno, subangulato.

Shell ovately oblong, or rather subtrapezoidal, thick, and strong; posterior side the longer and broader, somewhat angulated; ornamented with transverse lamellæ, radiatingly striated between the interstices; three teeth in each valve; palleal sinus large and subangulated.

Length, $\frac{5}{8}$ths of an inch; *height*, $\frac{3}{8}$ths ditto.

Locality. Red Crag, Walton-on-the-Naze.

Recent, Mediterranean, Britain.

Only two specimens of this species are in my cabinet, and they are all that I have seen; these are somewhat rubbed, with the lamellæ much worn down, but quite perfect enough to justify their being considered identical; my specimens are rather shorter than the generality of recent shells, although I believe in those there is considerable variation, and I have assigned it to the living species without any hesitation. In the recent state it is found imbedded in sponges and seaweed, as well as in rocks, and ranges from low-water mark to ten or a dozen fathoms.

CYTHEREA.* *Lamarck*, 1805.

ACTINOBULUS. *Klein*, 1753.
CHAMA. *Browne*, 1756.
VENUS (sp.) *Linn.*
CALLISTA CALLISTODERMA (sp.) *Poli*, 1795.
HYSTEROCONCHA. *Lang.*, 1722.
MERETRIX. *Lam.*, 1799.
CHIONE. *Gray*, 1838.
DIONE. *Id.* 1848.
GRESSLYA (sp.) *Agass.*, 1845.

Gen. Char. Shell equivalve, inequilateral, closed, usually more or less transversely oblong or ovate, sometimes obtusely triangular, generally thick and strong, with slightly prominent umbones. Surface sometimes transversely sulcated, usually smooth. Hinge furnished with three teeth in one valve, and four in the other; anterior one diverging under the lunule. Muscular impressions large and ovate, that by the mantle with a sinus generally large and wide. Ligament external.

Animal of the form of the shell, with the mantle freely open, having the margins without fringes; siphons long, united nearly to their extremities; orifices surrounded with tentacles. Foot large and tongue-shaped, not furnished with a byssal groove.

This genus may be considered as being distinguished more especially by its peculiarity of hinge. The anterior tooth, which gives a prominent character to the genus, is placed at right angles to the more cardinal teeth, and is situated at a little distance immediately under the lunule, giving great firmness and security to the close union of the valves; the composition of the shell is also somewhat different from that

* Etym., one of the names of Venus.

of *Venus*, which has the outer portion of a fibrous character, while in this it is more compact, and in the recent shell is often enamelled.

This genus is found extensively in the warmer regions of the globe; as a fossil it has been obtained very low in the secondary Formations, and was largely developed during the early Tertiary Periods.

1. CYTHEREA CHIONE, *Linnæus.* Tab. XX, fig. 4 *a*, *b*.

CHAMA. *Regenfuss.* Choix Coquil., p. 56, t. viii, fig. 17.
CURVIROSTRUM. *Leigh.* Nat. Hist. Chesh., p. 179, pl. iii, fig. 5, 1700.
VENUS CHIONE. *Linn.* Syst. Nat., ed. 12, p. 1131, No. 125, 1767.
— — *Poli.* Test. Sicil., vol. ii, p. 85, pl. xx, figs. 1, 2, 1795.
— — *Broc.* Conch. Foss. Subap., p. 547, 1814.
— — *Sismonda.* Syn. Meth. Invert. Foss. Ped., p. 19, 1847.
— CHIONOIDES? *Nyst.* Coq. Foss. de Belg., p. 175, pl. xii, fig. 5 *a*, *b*, 1844.
PECTUNCULUS GLABER. *Dacosta.* Brit. Conch., p. 184, pl. xiv, fig. 7, 1778.
DIONE GLABER. *Gray.* List Brit. Moll., p. 6, 1851.
CYTHEREA CHIONE. *Turt.* Brit. Biv., p. 160, pl. viii, fig. 11, 1822.
— — *Payr.* Catal. Moll. Corse., p. 47, 1826.
— — *Bronn.* Leth. Geogn., ii, p. 954, t. xxxviii, fig. 3*a*—*c*, 1838.
— — *Phil.* En. Moll. Sic., vol. i, p. 40, vol. ii, p. 31.
— — *Owen.* Comp. Anat. Invert. An. p. 282, fig. 118, 1843.
— — *Forbes.* Ægean Invert. Rep. Brit. Assoc., p. 180, 1843.
— — *Agass.* Icon. des. Coq. Tert., p. 45, t. x, figs. 10—13, 1845.
— NITENS. *Andr.* Bull. de Sc. de Mosc. p. 104, pl. vi, fig. 9, 1830, fide *Bronn.*
— LÆVIS. *Agass.* Loc. cit. supra, t. x.
CYTHERÉE FAUVE. *Chenu.* Traité Element., pl. iii, fig. 10.
Encyc. Method., pl. 266, fig. 1 *a*. *b*,

Spec. Char. Testâ transversâ, ovato-cordatâ, inæquilaterali, glabrâ, politâ, transversim obsoletè sulcatâ; lunulâ elongatâ; anticè et posticè rotundatâ.

Shell transverse, ovate, heartshaped, inequilateral, very smooth, and glossy; with obsolete transverse ridges; lunule elongate, and cordiform: anterior and posterior sides rounded.

Length, 2½ inches; *height*, 1¾ ditto.

Locality. Cor. Crag, Ramsholt

Recent, Britain, Mediterranean.

This elegant and beautiful shell I have seen only from the oldest of the Crag Deposits, and in that from the lowest part, where it is not rare, but of extreme fragility, and specimens are very difficult to be obtained.

The Crag shell agrees precisely with the British form of this species, in the exterior being smooth and glossy, and marked in a concentric direction, with occasionally shallow or indistinct furrows, or depressions, and with the aid of a lens may be seen numerous, fine, radiating striæ, most visible upon the posterior side; these, however, are quite superficial, and are not seen when the surface is removed, nor is it imparted in any way to the margin of the shell which is quite smooth.

Poli has given a beautiful drawing of the animal of this species, and its anatomy is described by Professor Owen in his Lectures upon Invertebrate Animals, where he considers it as one of the most highly organised of the Bivalvia. In the recent state this does not appear to have been a very deep water species, and seems more inclined to the southern or Mediterranean regions, where it is very abundant, and as a fossil I know it only from the Sicilian beds, unless *Venus chionoides*, Nyst, be one of its varieties. *C. Chione*, Dubois, Wolhyn. Podol., pl. v, figs. 13, 14, appears to have ridges too regular and too numerous, and according to the figure, is rather too broad on the posterior side, with the sinus in the mantle mark more rounded, and appears to be intermediate between our shell and *Erycinoides*.

Cytherea nitidula, Lam., a recent species from the Mediterranean, is considered by Philippi as the young of this shell, but the fossil from the older Tertiaries described under the same name, is quite distinct.

2. CYTHEREA RUDIS, *Poli*. Tab. XX, fig. 5 *a—d*.

VENUS RUDIS. *Poli*, (not Dujard.) Test. Sicil., vol. ii, p. 94, t. xx, figs. 15, 16, 1795.
— — *Middendorff*. Malacozool. Rossica, p. 571, 1849.
— PECTUNCULUS. *Broc*. Conch. Foss. Subap., p. 560, pl. xiii, fig. 12, 1814.
— CYCLADIFORMIS. *Nyst*. Coq. Foss. de Belg., p. 171, pl. xii, fig. 3, 1844.
— VENETIANA. *Sismonda*. Syn. Meth. Invert. Pedm., p. 20, 1847.
— OCHROPICTA. *Krynicki*. Bull. des Natur. de Mosc., No. 11, p. 64, fide *Middendorff*.
CYTHEREA VENETIANA. *Lam*. Hist. des An. s. Vert., tom. v, p. 569, 1818.
— — *Phil*. En. Moll. Sic., vol. i, p. xl, t. iv, fig. 8, 1836.
— — *Dujard*. Mem. de la Soc. Geol. de Fr., t. ii, part ii, p. 260, 1837.
— — *Forbes*. Ægean Invert. Rep. Brit. Assoc., p. 182, 1843.
— FILOSA. *S. Wood*. Catalogue, 1840.
— CYCLADIFORMIS. *Nyst*. Rech. Coq. Foss. d'Anv., p. 10, No. 38, pl. ii, fig. 38, 1835.
— RUDIS. *Phil*. En. Moll. Sic., vol. ii, p. 32, 1844.

Spec. Char. Testâ obliquè-cordatâ, tumidâ, inæquilaterali, tenui, transversim striatâ, striis tenuibus, rotundatis, confertis; lunulâ elongato-cordatâ, margine integro; umbonibus, prominulis.

Shell obliquely heartshaped, tumid, inequilateral, thin, transversely or concentrically striated; striæ fine, close, and rounded; lunule of an elongated heartshape; margin smooth; beaks slightly prominent.

Length, $\frac{7}{8}$ths of an inch; *height*, $\frac{3}{4}$ths of an inch.

Localities. Cor. Crag, Sutton, Ramsholt, Sudbourn.
Red Crag, Sutton, and Walton-on-the-Naze.
Recent, Mediterranean, and Black Sea.

This delicate and elegant shell is very abundant in the Red Crag at Walton-on-the-Naze, and not at all rare in the Lower Formation, or Cor. Crag at Sutton.

It is subject to considerable variation in outline, and in proportional dimensions,

but in general the form is transverse, with a diameter of seven to five; while in others there is no difference, the height being equal to the length. The hinge is furnished with three teeth in the right valve, and four in the left, the posterior one small, parallel to, and a little within the fulcrum for the ligament: in the right valve the posterior tooth is bifid or cleft; the surface is ornamented with numerous close set striæ, broader than the spaces between them, and sometimes rather irregular, bifurcating or inosculating, more especially on the posterior part; the impression of the mantle is at some distance within the margin, and the sinus large, rounded, and reaching about one third across the shell.

A species from the older Tertiaries at Barton, figured and described by J. Sowerby in 'Min. Conch.,' t. 422, fig. 2, (*V. rotundata*, Brander, figs. 91, 93,) very much resembles our Crag fossil, but is, I believe, distinct.

VENUS. *Linnæus.*

CALLISTA AND CALLISTODERMA (sp.) *Poli*, 1795
ANTIGONE. *Schum.*, 1817.
VENULITES. *Schlott.*, 1820.
CLAUSINA. *Brown*, 1827.
ORTYGIA. "*Leach, MS.*," id.
TIMOCLEA. *Id.* id.
CHIONE. *Megerle*. 1811; *Gray*, 1851.
DOSINA. *Gray*, 1838; *Wood*, 1840.
EGESTA? *Conrad*, 1845.

Gen. Char. Shell equivalve, more or less inequilateral, closed; orbicular or transversely ovate, generally ornamented upon the exterior, imbricated, radiated, or decussated. Margin crenulated. Hinge composed of three diverging cardinal teeth in each valve. Ligament external. Muscular impressions roundedly ovate. Mantle mark sinuated.

Animal ovate or suborbicular, with the edges of the mantle disconnected; margins fringed. Siphons united at the base, separated and diverging at their extremities; orifices fimbriated; foot linguiform.

This genus, as the name would imply, is composed of beautiful, and in the living state, of many highly ornamented shells, and found in the seas of all regions. Notwithstanding its great curtailment since the time it was established by Linnæus, it now contains at least a hundred well determined species, restricting them to such as possess a dental armature of three diverging cardinal teeth, while the animal possesses two rather short siphons, giving a somewhat small and angular sinus to the impression of the mantle mark; the texture of the shell, at least the outer portion of it, appears to be of a fibrous character, and it is generally covered with fine and numerous striæ in a radiating direction, and is more or less ornamented with reflexed portions of the margin or imbrications, and some few are armed with long and formidable looking spines.

Fossils in the Carboniferous Deposits have been assigned to this genus, but perhaps their just claim will not go further than a resemblance, or what is called a family relationship, their true characters not having been well determined.

1. VENUS CASINA, *Linnæus.* Tab. XIX, fig. 1 *a—f.*

VENUS CASINA. *Linn.* Syst. Nat., 12 ed., p. 1130, No. 117, 1767.
— — *Dujard.* Mem. de la Soc. Geol. de Fr., t. ii, part 2, p. 261, 1837.
— — *Phil.* En. Moll. Sic., vol. ii, p. 33, 1844.
— — *Lovén.* Ind. Moll. Scand., p. 39, 1846.
— DISCINA. *Lam.* An. sans Vert., t. v, p. 586, 1818.
— REFLEXA. *Mont.* Test. Brit. Suppl., pp. 41, 168, 1808.
— RUSTERUCII. *Payr.* Cat. Moll. Cors., p. 52, pl. i, figs. 26—28, 1826.
— GIBBOSA. *J. Sow.* Min. Conch., t. 155, fig. 3, 1817.
— TURGIDA. *J. Sowerby.* Min. Conch., t. 256, 1820.
— — *Nyst.* Conch. Foss. de Belg., p. 178, pl. xiii, fig. 4 *a*, *b*, 1844.
— SENILIS? *Dubois.* Wolhyn. Podol., p. 60, pl. v, figs. 22, 23.
— SULCATA. *Nyst.* Loc. cit. sup., p. 177, pl. xii, fig. 6 *a*, *b*, 1844.
— MULTILAMELLOSA? *Nyst.* Id., p. 179, pl. xii, fig. 7 *a*, *b*.
— SIMILIS? *Id.* Id., p. 180, pl. xiii, fig. 5 *a*, *b*.
— GALLINA? *Bronn.* Leth. Geog., vol. ii, p. 948, t. xxxviii, fig. 6.
— CASINULA? *Desh.* Exped. Morèe, p. 101, t. xviii, figs. 18, 19.
— CINCTA. *Agass.* Icon. des Coq. Tert., p. 36, t. iv, figs. 7—10, 1845.
PECTUNCULUS MEMBRANACEUS. *Dacosta.* Brit. Conch., pl. xiii, fig. 4.
CYTHEREA SULCATA. *Nyst* et *West.* Nouv. Rech. des Foss. d'Anv., pl. i, fig. 9, 1839.
— LAMELLATA. *Id.* „ „ „ p. 9, pl. i, fig. 10.
CLAUSINA REFLEXA. *Brown.* Illust. Brit. Conch.. pl. xix, fig. 13, 1827.
— CASINA „ „ „ pl. xx, fig. 15.
DOSINA CASINA. *Gray,* Analyst, 1838.
— TURGIDA. *S. Wood.* Catalogue.

Spec. Char. Testá cordato-rotundatá, gibbosá, interdum compressá, crassá; imbricatá vel lamellatá; lamellibus confertis, acutis; margine crenulato; lunulá distinctá, impressá.

Shell roundedly heartshaped, gibbous, sometimes compressed, thick, and covered with concentric imbrications, close, sharp, and reflexed; margin crenulated; lunule distinct, impressed.

Diameter. 2 inches, nearly.

Localities. Cor. Crag, Ramsholt, Sutton, Gedgrave, Sudbourn.
Red Crag, Sutton, Bawdsey, Felixstow, Alderton.
Mam. Crag, ? Clyde beds.
Recent, Mediterranean, Britain, Bergen.

This shell as a Crag fossil is everywhere abundant, and exceedingly variable in outward form, being sometimes longer than it is high, while in other specimens the diameter is greater in the opposite direction; in some individuals there is considerable tumidity, while others are much compressed.

It is assigned to the living species from the belief that some of its varieties

are so intimately connected that no specific character can be pointed out, whereby it can possibly be distinguished or separated from it.

In the recent shell the umbo appears, in the few specimens I have been able to examine, to be a little more lateral than in the generality of the Crag fossils, although this lateral incurvature of the umbo is quite as distinct in the extreme of its variation as in the living shell. Although considered as extinct by all previous authorities, and to which I submitted when compiling my own Catalogue, the possession of many more varieties, and further examination, have given me reason to dissent from that opinion. The lamellæ of the fossil are not often preserved in Cabinet specimens; when visible they are sharp and erect, and about equidistant, rather less prominent upon the posterior margin, but that is a character upon which two species in the living state have been formed, and is not much to be depended on; between the lamellæ fine radiating striæ are visible, corresponding to the crenulated margin of the interior.

2. VENUS FASCIATA, *Dacosta*. Tab. XIX, fig. 5 *a—c*.

PECTUNCULUS FASCIATUS. *Dacosta*. Brit. Conch., p. 188, t. xiii, fig. 3, 1778.
VENUS PAPHIA. *Pulteney*. Hutchins' Hist. Dorset., p. 33.
— — *Mont*. Test. Brit., p. 110, 1803.
— FASCIATA. *Don*. Brit. Shells, vol. v, pl. 170, 1803.
— — *Phill*.. En. Moll. Sic., vol. ii, p. 34, 1844.
— — *Lovén*. Ind. Moll. Scand., p. 39, 1846.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. i, p. 415, pl. 23, fig. 3, pl. xxvi, fig. 7, and pl. L, fig. 7, 1848.
— BROGNIARTI. *Payr*. Cat. Moll. Cors., p. 51, pl. i, figs. 23—25, 1826.
— — *Phil*. En. Moll. Sic., vol. i, p. 43, 1836.
CHIONE FASCIATA. *Gray*. List Brit. Moll., 1851.
CLAUSINA FASCIATA. *Brown*. Illust. Brit. Conch., pl. xx, fig. 10, 1827.
DOSINA — *S Wood*. Catalogue, 1840.
PECTUNCULUS FASCIATIS. *List*. Hist. Conch., lib. iii, sect. 4, fig. 114, 1688.
Encyc. Method., pl. 276, fig. 2.

Spec. Char. Testâ crassâ, compressiusculâ, ovato-trigonâ vel sub-cordatâ, inæquilaterali, latere postico longiore; lamellatâ, lamellis crassis, recurvis, distantibus; lunulâ elongato-cordatâ; umbonibus prominulis.

Shell thick, somewhat compressed, triangularly ovate, inequilateral, posterior side the longer, and very little pointed; covered with thick, distant, and slightly recurved lamellæ, or concentric ridges; lunule elongated, heart shape.

Length, $\frac{3}{4}$ths of an inch; *height*, $\frac{5}{8}$ths ditto.

Localities. Red Crag, Sutton, Walton-on-the-Naze.
Mam. Crag, Bramerton.
Recent, Mediterranean, Britain, Scandinavia.

I have only met with true and genuine specimens of this species as far back as the Red Crag, where it was not very abundant. The young state of *Venus imbricata*, in some of its forms, strongly resembles this shell, except where the lamellæ are well pre-

served: in this species the ridges are more numerous about the umbo or in the young shell, whereas in the other they are more prominent and distant, and in the mature state this species never attains to so great a size: the posterior side is sometimes slightly pointed, and the length is generally greater than the height, but occasionally the greater dimensions are the reverse. In the living state it is said to have a vertical range from four to sixty fathoms.

3. VENUS IMBRICATA, *J. Sowerby*. Tab. XIX, fig. 3 *a—f*.

ASTARTE IMBRICATA. *J. Sow.* Min. Conch., t. 521, fig. 1, 1826.
— — *Nyst.* Coq. Foss, de Belg., p. 153, pl. ix, fig. 3 *a*, *b*, 1844.
DOSINA IMBRICATA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ suborbiculari, subcordatâ, compressiusculâ aut tumidâ, crassâ, imbricatâ, imbricibus crassis 12—16, *reflexis, striatis; natibus recurvis; lunulâ ovato-cordatâ; marginibus crenulatis; sinu palliari parvo, angulato.*

Shell suborbicular, slightly heartshaped, somewhat compressed, occasionally tumid, thick and imbricated, with 12—16 broad, thick, reflexed ridges or imbrications; umbones recurved; lunule impressed, elongate; margins crenulated; palleal sinus small and angular.

Diameter, $1\frac{1}{4}$ inch.

Localities. Cor. Crag, Ramsholt, and Gedgrave.
Red Crag, Sutton, Walton-on-the-Naze.

This species is not particularly abundant either in the Coralline or in the Red Crag, and appears in both to be subject to considerable variation.

There are two very distinct forms in this species: what may be called var. *a*, (fig. *c*, *d*,) which, in its extreme form, is an elegant shell, curving considerably towards the anterior, and ornamented with about sixteen thick, obtuse, but reflected ridges, at nearly regular distances, the fine lamellated ornament of the young shell is worn down in those from the Red Crag, from which Formation only I have seen this variety. In this state it approaches very near to *V. casina*, differing only in the exterior ornament. Var. β, or *gibberosa*, (fig. *e*,*f*,) on the contrary, is very inelegant, being a thick, tumid, and clumsy looking shell, with a hunchedback and, in most instances, bipartite, the older portion having a very different appearance from that of the young shell, in which the surface is furnished with a few sharp, erect, and distant lamellæ, about eight or ten, and these, at the extreme edge or posterior margin, terminate abruptly, and are sharp and almost pointed, after which the shell is nearly smooth, the lamellæ being so close as to represent little more than lines of growth with an irregular surface. In this variety the shell is nearly orbicular, very tumid, and is rather higher than it is long, the other variety is more compressed, and the diameter is greater in a longitudinal direction; between these extremes there is every imaginable variation, and the specimen represented in 'Min. Conch.,' appears somewhat of an intermediate character, having the surface flattened by the abrasion of the lamellæ.

2. VENUS OVATA, *Pennant.* Tab. XIX, fig. 4 *a—d.*

VENUS OVATA. *Penn.* Brit. Zool., vol. iv, p. 206, t. 59, fig. 3, 1777.
— — *Forbes.* Ægean Invert. Rep. Brit. Assoc., p. 182, 1843.
— — *Lovén.* Ind. Moll. Scand., p. 40, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 419, pl. xxxiv, fig. 2, and pl. xxvi, fig. 1, and pl. L, fig. 6, 1848.
— RADIATA. *Broc.* Conch. Foss. Subap., p. 543, t. xiv, fig. 3 *a*, *b*, 1814.
— — *Bast.* Mem. Soc. d'Hist. Nat. de Par., t. ii, pt. i, p. 89.
— — *Marcel de Serres.* Geog. des Terr. Tert., p. 150, 1829.
— — *Phil.* En. Moll. Sic., vol. i, p. 44, vol. ii, p. 34.
— SPADICEA. *Renieri.* Fide Brocchi.
— — *Nyst.* Coq. Foss. de Belg., p. 165, pl. ii, fig. 3, 1844.
— PECTINULA. *Desh.* 2d. edit. Lam., t. vi, p. 348, 1 35.
CARDIUM STRIATUM RADIATUM. *Walk.* and *Boys,* Test. Min. Ror., p. 23, fig. 82, 1787.
TIMOCLEA OVATA. *Brown.* Illust. Brit. Conch., pl. xix, fig. 11, 1827.
— PENNANTII. *Leach, MS.* Fide Brown.
CYTHEREA OVATA. *Fleming.* Brit. An., p. 445, 1828.
CHIONE OVATA. *Gray.* List of Brit. Moll., p. 11, 1851.

Spec. Char. Testâ ovato-trigonulâ, inæquilaterali, crassâ, anticè rotundatâ, posticè angulatâ; radiatim sulcatâ, sulcis granulatis; lunulâ distinctâ elongato-cordatâ; margine tenuissimè crenulato.

Shell triangularly ovate, inequilateral, thick; anterior side rounded, posterior very slightly elongated; covered with radiating, bifurcating, and granulated striæ; lunule elongated, heartshaped; margin very finely crenulated.

Length, $\frac{5}{8}$ths of an inch; *height,* $\frac{1}{2}$ an inch.

Localities. Cor. Crag, Sutton, Gedgrave.
Red Crag, Sutton.

Recent, Mediterranean, Britain, Scandinavia.

This shell is exceedingly scarce in the Red Crag, but in the older or subjacent deposit it is particularly abundant, more especially at Sutton, where the specimens are almost entirely of one variety, in which the rays are finer and flatter, bifurcating about the middle of the shell, giving, on the outer portion, as many as forty or fifty ridges; those which are found at Gedgrave have the rays larger, more elevated, and rounded, with a more roughened surface, and are seldom divided, having also a wider space between them: in the other variety they are but little imbricated, and have the intermediate spaces or sulci very narrow; the form is somewhat variable, but in general the older shell has comparatively a greater length than in the young state, and is always a little longer than it is high; upon the Gedgrave shell, or var. β, there is an obtuse ridge upon the posterior side, behind which the rays are closer and more numerous; this corresponds with the Italian fossil, *V. radiata,* Broc., while the Sutton specimens more resemble the common form of the recent British shell.

This species is said to be abundant in the British seas, with a vertical range from three to one hundred fathoms; it is found fossil at Stromstadt.

Artemis,* *Poli.* 1791.

Chama (Dosin.) *Adans.*, 1757.
Dosinia. *Scopoli*, 1777; *Gray*, 1851.
Circomphalus (sp.) *Klein*, 1753.
Artemis et Artemiderma. *Poli*, 1791.
Orbiculus. *Megerle*, 1811.
Asa. *Leach, MSS.*, 1819, fide *Defrance.*
Exoleta. *Brown*, 1827.
Arctoë. *Risso*, 1826.
Taras. *Id.*
Arthemis. *Desh., Phil., Blainv., Agass.*

Gen. Char. Shell suborbicular or lenticular, equivalved, more or less compressed, generally strong and closed, surface covered with concentric striæ; margins entire. Hinge composed of three cardinal teeth in one valve, and four in the other; no lateral teeth. Ligament external, with a strongly defined, and generally deep lunule. Impressions of the adductor muscles ovate, nearly equal, that by the mantle deeply sinuated.

Animal suborbicular, with the edges of the mantle mostly disconnected; margins entire, or partially serrated. Siphonal tubes long, united to their extremities. Foot large, semilunar, or crescent-shaped, exsertible at the middle or basal margin of the valves.

This is a well-marked genus, said to be characterised especially by its animal inhabitant, but if our reliance were solely upon the softer parts, to the entire exclusion of the shell, it might be difficult to know where it should be placed. There is, however, not much doubt respecting its relationship to the Venus group, but this affinity is better displayed in the hard or shelly covering of the animal, than by any general resemblance of either the foot, or the siphons of the mantle. The long siphonal tubes of this genus are indicated in the shell by the impression of the retractor muscles being placed far in the interior, so as to give what is called a very deep palleal scar or sinus, denoting, by its depth, a corresponding proportion in the length of the tubes, this however, is not an infallible criterion as to their length, nor does it appear to be a character of any great family dependence, for in *Lucinopsis* the interior of the shell is marked by the impression of the mantle with quite as deep a sinus, while the animal has the tubes short and slightly exsertile, with a slender and delicate foot, and has little or no resemblance, any further than in the form of the mantle mark, to animals of this genus, where the siphons are long and united, and the foot is broad and splayed.

In the recent state it has a wide geographical range; as a fossil I am not aware of its having been found in any older Formation than the Middle Tertiaries.

* Etym., a proper name.

1. ARTEMIS LENTIFORMIS, *J. Sowerby*. Tab. XX, fig. 7 *a—c*.

VENUS EXOLETA. *Parkinson*. Org. Rem., vol. iii, p. 189, 1811.
— LENTIFORMIS. *J. Sow*. Min. Conch., t. 203, 1818.
ARTEMIS EXOLETA. *Nyst*. Coq. Foss. Belg., p. 184, pl. xiv, fig. 1, 1844.
— LENTIFORMIS. *S. Wood*. Catalogue, 1840.
— — *Potiez* et *Mich*. Catal. des Moll. de Douai, tom. xi, p. 227, No. 13, 1844.

Spec. Char. Testâ orbiculari, lentiformi, compressiusculâ inæquilaterali, crassâ; striis concentricis, magnis, confertis; lunulâ cordatâ, impressâ; margine dorsali convexiusculo posticè subangulato.

Shell orbicular, lentiform, somewhat compressed, slightly inequilateral, thick; covered with numerous large, close set, concentric striæ; a deeply-seated heartshaped lunule; dorsal margin slightly convex; posterior side subangulated.

Diameter, 2 inches.

Localities. Cor. Crag? Gedgrave.
Red Crag, Sutton, Walton-on-the-Naze.

In the Coralline Crag it is very rare; indeed I have obtained only one specimen, which is represented at fig. 7 *c*, and this is partly imbedded in the matrix with its best characters obscured; but in the Red Crag it is one of the most abundant shells at Walton-on-the-Naze.

In the 'Mineral Concology' the Crag shell was considered to differ from *Venus exoleta* (with which it had been placed by Parkinson) sufficiently to justify a specific distinction, and as this is a genus in which the species do not appear to possess a great range in variation, I have retained for it Mr. Sowerby's name, although these differences are probably the effect of locality, or the result of external conditions.

Our shell is certainly flatter than *V. exoleta*, but not thinner; the striæ or ridges are as large and broad as those which ornament the recent species; there is a slight angularity in the outline on the posterior side, a little beyond the termination of the large ligament, and a slight slope upon the dorsal edge, differing therein from *V. exoleta*; this slope is not naked, but covered with numerous striæ or fine lines of growth. The sinus in the mantlemark is large, deep, and linguiform in a direction across the shell; I have never seen a specimen with this sinus so vertical as it is represented in 'Min. Conch.' above referred to.

2. ARTEMIS LINCTA, *Pulteney*. Tab. XX, fig. 6 *a—d*.

VENUS LINCTA. *Pult*. Hutchins, Dorset, p. 34, fide Forb. and Hanl.
— EXOLETA. *Penn*. Brit. Zool., vol. iv, p. 94, pl. lvi, fig. 49.
— — var. β. *Mat*. and *Rack*. Linn. Trans., vol. viii, p. 87, pl. iii, fig. 2, 1807.
— SINUATA. *Turt*. Ed. Linn., vol. iv, p. 233, 1806.
— LUPINA. *Poli*. Test. Sicil., t. xxi, fig. 8.
— LACTEA. *Mont*. Test. Brit. Sup., p. 46, 1808.

CYTHEREA LINCTA. *Lam.* An. sans Vert., t. v, p. 573, 1818.
— — ? *Basterot.* Bord. Foss., p. 90, pl. vi, fig. 10, 1825.
— — *Phil.* En. Moll. Sic., vol. i, p. 41, vol. ii, p. 32.
— — *Dujard.* Mém. Soc. Géol. de France, t. ii, part ii, p. 260, 1837.
— — *Bronn.* Leth. Géogn., p. 955, t. xxxviii, fig. 4 *a—c*, 1838.
— SINUATA. *Turt.* Brit. Biv., p. 163, 1822.
ASA LINEATA. *Leach, MSS.* Defrance, Coll. ex Basterot.
EXOLETA LINCTA. *Brown.* Illust. Brit. Conch., pl. xx, fig. 4, 1827.
ARTEMIS — *Forbes.* Ægean. Invert. Rep. Brit. Assoc., p. 180, 1843.
— — *Lovén.* Ind. Moll. Scand., p. 39, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 431, pl. xxviii, figs. 5, 6, 1848.
— SINUATA. *S. Wood.* Catalogue, 1840.
— COMPTA. *Lovén.* Ind. Moll. Scand., p. 39, fide Alder.
ARTHEMIS LINCTA. *Agassiz.* Icon. des Coq. Tertiares (Extr. des Nonv. Mém. de la Soc. Helv. des Sc. Nat., tome vii, 1845,) p. 22, t. iii, figs. 11—14.
DOSINIA LINCTA. *Gray.* List. Brit. Moll., p. 4, 1851.
Lister. Hist. Conch., lib. iii, fig. 126.

Spec. Char. Testâ suborbiculari, lentiformi, subinæquilaterali, concentricè striatâ striis numerosis, confertis lævibus; lunulâ cordatâ impressâ.

Shell suborbicular, lentiform, subinequilateral, fragile, covered with numerous close set striæ; lunule heartshaped; impression of the mantle with a deep tongue-shaped sinus.

Diameter, $1\frac{1}{2}$ inch.

Localities. Cor. Crag, Sutton, Ramsholt.
Red Crag, Walton-on-the-Naze.
Recent, Mediterranean, British and Norwegian Seas.

Not very rare either in the Coralline or in the Red Crag, but the specimens are in general extremely fragile and very difficult to procure; they are much thinner than those of the preceding species, and appear to have less of animal matter remaining; although this is much less abundant than *A. lentiformis*, it appears to present a greater diversity of character in the outline, and I have thought it necessary that two forms should be represented: where individuals have become more elongated than what might be considered as the normal form of the species the shell is invariably more convex or tumid, so that an equal quantity of space is occupied by the animal.

It is said in the recent state in the British seas to have a range in depth varying from low water mark to the depth of sixty fathoms.

Mr. Smith, of Jordan Hill, enumerates *Cytherea exoleta* in his Catalogue of Shells from the Clyde Beds. Mem. Wern. Nat. Hist. Soc., v l. viii, p. 45, 1838.

GASTRANA,* *Schum.* 1817.

TELLINA (sp.) *Linn.* *Chemn.*
VENUS (sp.) *Retz.* 1788.
PSAMMOBIA (sp.) *Lam.* 1818. *Turt.* 1822. *Flem.* 1828.
PETRICOLA (sp.) *J. Sow.* *Lam.*
DIODONTA. *Desh.* 1845. *Forb.* and *Hanl.* 1848. *Gray,* 1851. *Woodward,* 1854.

Generic Character. Shell equivalved, inequilateral, transverse, ovate or subtrigonal, covered with concentric striæ or lamellæ. Hinge with two teeth in one valve, and one large subbifid tooth in the other. Impressions by the adductors ovate, nearly equal, that by the mantle with a sinus wide and deep. Ligament external.

Animal with the mantle open, and fimbriated margins; siphons long, unequal, and separated to their bases, with slightly fringed orifices; foot linguiform.

This appears to be a very well marked genus, and strongly characterised by its dentition. A few species only are as yet known either in a recent or fossil state. I have not seen it from any older formation than the Faluns of Touraine. One fossil species has been brought from South Africa, belonging to a tertiary deposit.

1. GASTRANA LAMINOSA, *J. Sowerby.* Tab. XXV, fig. 1, *a—e.*

PETRICOLA LAMINOSA. *J. Sow.* Min. Conch., t. 573, 1827.
— — *Nyst.* Coq. Foss. de Belg., p. 99, pl. 3, fig. 16, 1844.

Spec. Char. Testâ subirregulari, ovatâ vel trigonulâ, convexiusculâ, clausâ, inæquilaterali; anticè rotundatâ, posticè angulatâ; lamellatâ, lamellis erectis acutis, striis interstitiis exilioribus; cardine bidentato; sinu palliari magno.

Shell somewhat irregular, slightly convex, ovate or trigonular, closed, inequilateral; anterior side rounded, posterior angulated; covered with sharp and erect concentric ridges or lamellæ, and very fine radiating striæ between them; hinge with two teeth, palleal sinus large.

Length, 2¼ inches. *Height,* 1⅝ inch.

Locality. Cor. Crag, Ramsholt, Gedgrave, Sutton.
Red Crag, Sutton, Alderton, Bawdsey, Walton Naze.

This species is not particularly rare either in the Coralline or in the Red Crag. It has considerable resemblance to *Tellina fragilis,* Linn. (*Petricola ochroleuca,* Lam.), but appears to differ sufficiently to be removed from that species. Like it, however, it was subject to much distortion; and though the valves are found free, its habits were probably such as to lead it into confined situations, so as oftentimes to impede the

* Etym.? γαστήρ, ventral.

regularity of growth. The principal difference between this and *G. fragilis* is a larger posterior side, which is biangulated, the posterior dorsal portion not sloping off to a point as in the recent shell: the laminæ in our fossil are also larger, more remote, and the palleal sinus extends only to a line drawn perpendicularly from the umbo; in *G. fragilis* it projects beyond. The right valve of our shell has two large diverging teeth, while the left one possesses one large central, triangular, bifid tooth, with a cavity on each side, and two small rudimentary teeth; a large fulcrum for the ligament; the laminæ are prominent, and erect, not reflexed.

Tellina fragilis, Linn., is found fossil in the Sicilian Beds, as, also, quoted in the Faluns of Touraine; but I have not seen it from the Crag.

Donax,* *Linnæus.* 1758.

Tellina. *Adans,* 1757.
Chion. *Scopoli,* 1777.
Cuneus. *Da Costa,* 1778.
Serrula. *Chemn.* 1782.
Capisteria. *Gevers,* 1787. Sec. *Gray.*
Peronæa, Peronæoderma (sp.) *Poli,* 1791.
Latona.—*Schum.* 1817.
Hecuba. *Id.*
Iphigenia? *Id.*
Capsa. *Lam.* 1818.
Donacina. *Ferus.* 1821.
Egeria? (sp.) *Lea.* 1833.

Generic Character. Shell transverse, inequilateral, equivalved, more or less wedge-shaped; posterior side the shorter; surface generally smooth and glossy, sometimes finely striated or decussated; covered by an epidermis in the recent state. Margin plain or crenulated. Hinge composed of two cardinal teeth in one valve, and one in the other, with more or less developed lateral teeth. Muscular impressions ovate with a large and deeply indented mantle-mark. Ligament external.

Animal somewhat oblong, the mantle open in front, with fringed or partially fringed margins. Siphons not very long, separated their entire length; foot large, sharp edged, and pointed.

The principal distinction between this genus and that of *Tellina* is the truncation of the posterior side, and the general wedge-shaped form of the shell, as also the absence of the flexous fold in the margin, and it is in general more inequilateral, but the two genera are very closely allied. *Tellina* is made the type of a family by the malacologists, and the present genus is alike honoured with a similar distinction, upon what grounds they are so widely separated I am unable to discover.

A fossil from the Carboniferous Period is described under this name, but its true generic position is doubtful, and there is no certainty of its existence in the fossil state anterior to the older Tertiaries.

* Etym. δοναξ, a sea-fish. Pliny.

The habits of the living species are generally littoral; and they bury themselves in the sand, leaving their siphons on a level with the surface.

1. DONAX VITTATUS, *Da Costa*. Tab. XXII, fig. 7, *a*, *b*.

DONAX TRUNCULUS.	*Linn.*	Syst. Nat., ed. 12, p. 1127, fide *Forb.* and *Hanl.*
— —	*Penn.*	Brit. Zool., ed. 4, vol. iv, p. 93, pl. 55, fig. 45.
— —	*Lovén.*	Ind. Moll. Scand., p. 42, 1846.
— VITTATUS.	*Gray.*	List Brit. Moll., p. 46, 1851.
— ANATINUS.	*Forb.* and *Hanl.*	Hist. Brit. Moll., vol. i, p. 332, pl. 21, figs. 4—6, and pl. K, fig. 7, 1848.
— RUBER.	*Turt.*	Brit. Biv., p. 127, pl. 10, fig. 14, 1822.
CUNEUS VITTATUS.	*Da Costa.*	Brit. Conch., p, 207, t. 14, fig. 3, 1778.

Spec. Char. Testâ transversâ, oblongâ vel cuneiformi, inæquilaterali; posticè breviore, truncatâ, anticè rotundatâ; tenuissimè striatâ, obsoletè decussatâ; margine ventrali convexiusculo, crenulato.

Shell transversely oblong or wedge-shaped, inequilateral; posterior side the shorter, truncated, and obtusely pointed; anterior rounded; striated externally and somewhat obscurely decussated; ventral margin slightly convex and crenulated.

Length, $1\frac{1}{4}$ inch. *Height*, $\frac{5}{8}$ths of an inch.

Locality. Mam. Crag, Bramerton. Recent, British Seas.

This common living species I have seen only from the above locality, where I am informed it is by no means rare.

2. DONAX TRUNCULUS, *Linnæus*. Tab. XXII, fig. 8, *a*, *b*.

DONAX TRUNCULUS.	*Linn.*	Syst. Nat., ed. 12, p. 1127, 1767.
— —	*Born.*	Test. Mus. Cæs., p. 54, t. 4, figs. 3, 4, 1780.
— —	*Poli.*	Test. Sicil., vol. ii, p. 76, t. 19, figs. 12—20, 1795.
— —	*Savigny.*	Descr. de l'Egypt, tom. xxii, p. 198, pl. 8, fig. 14.
— —	*Phil.*	En. Moll. Sic., vol. i, p. 36; vol. ii, p. 28.
— —	*Broc.*	Conch. Foss. Subappen., p. 535, 1814.
— —	*Desh.*	Exped. Scient. Alger. Moll., pl. 74, figs. 1—5; and pl. 75.
— TRUNCATA.	*S. Wood.*	Catalogue, 1840.
CAPSA TRUNCULUS.	*Hanley.*	Recent Shells, p. 87, pl. 11, fig. 38.
SERRULA LÆVIGATA.	*Chemn.*	Conch. Cab., vol. vi, p. 259, pl. 26, figs. 253, 254, 1782.
LE GAFET?	*Adans.*	Nat. Hist. Senegal, t. 18, fig. 2.

Spec. Char. Testâ transversâ, cuneatâ, lævigatâ, valdè inæquilaterali; latere postico brevissimo, truncato; margine ventrali crenulato.

Shell transverse, wedge-shaped, and smooth, inequilateral; posterior side very short and truncated; ventral margin nearly straight and crenulated.

Length, 1 inch. *Height*, $\frac{1}{2}$ an inch.

Locality. Red Crag, Sutton. Recent, Mediterranean.

This shell is rare in my cabinet, and I have met with it from one locality only. It appears to differ from the preceding, and to correspond with the Mediterranean form in having a much shorter posterior side, it is also smoother externally, with less distinct radiating striæ, and the ventral margin not so much curved; the dentition is much the same in both species, though somewhat more strongly marked in *D. anatinus*.* The sinus in the mantle mark extends nearly to the middle, rather further beyond the hinge than in the British shell, with a few other minor differences; and as the British Conchologists have separated the recent shells into two species, the fossil forms seem to warrant a similar proceeding. Philippi mentions this among the Red Sea Shells collected by Von Hemprich and Ehrenberg.

3. DONAX POLITUS, *Poli*. Tab. XXII, fig. 9, *a*, *b*.

TELLINA POLITA. *Poli*. Test. Sicil., vol. i, p. 44, pl. 21, fig. 14, 1791.
— VINACEA. *Gmel*. Syst. Nat., p. 3238.
DONAX COMPLANATA. *Mont*. Test. Brit., p. 106, pl. 5, fig. 4, 1803.
— — *Phil*. En. Moll. Sic., vol. ii, p. 28, 1844.
— LONGA. "*Bronn*." *Phil*. En. Moll. Sic., vol. i, p. 37, pl. 3, fig. 13, 1836.
— GLABRA. *S. Wood*. Catalogue, 1840.
— POLITUS. *Forb*. and *Hanl*. Hist. Brit. Moll., vol. i, p. 336, pl. 21, fig. 7, 1848.
CAPSA COMPLANATA. *G. B. Sow*. Gen. of Shells, No. 10, fig. 2.
PSAMMOBIA POLITA. *Costa*. Catal. Test. Sicil., p. 20, No. 14.

Spec. Char. Testâ elongato-cuneiformi, complanatâ, lævigatâ, politâ, tenui, inæquilaterali; latere antico longiore; latere postico angulato; margine integro.

Shell elongately wedge-shaped, flattened or compressed, smooth and glossy, thin, inequilateral; anterior side the longer, produced; posterior angulated; margin smooth.

Length, 1 inch. *Height*, $\frac{1}{2}$ an inch.

Locality. Cor. Crag, Sutton and Gedgrave.

Recent, Britain and Mediterranean.

Small specimens not exceeding half an inch in length are abundant at Sutton, but fragments indicate a magnitude of at least an inch and a quarter. This elegant shell is beautifully glossy in those specimens that are well preserved, but the generality are

* In the 'Hist. Brit. Moll.,' vol. i, p. 340, the hinge of *D. trunculus* is said to be destitute of lateral teeth, while they are described (p. 332) as being present in *D. anatinus*. I have not been able to make that distinction. There is a prominent lateral tooth in my fossil on the posterior side, beyond the ligamental support.

more or less uncoated. Unlike the preceding species, this is free from radiating striæ, and the margin is in consequence quite smooth. The form of this is also different, and may be readily distinguished. The palleal sinus is large and deep, extending beyond the hinge area, and in some old shells the interior is considerably thickened.

Poli has given a good representation of the shell of this species; but in depicting the animal he has made the siphons to protrude on the longer, and the foot at the shorter or posterior side.

Psammobia,* *Lam.* 1818.

Lux. *Chemn.* 1782.
Gari. *Schum.* 1817.
Psammotæa. *Lamk.* 1818.
Psammotea. *Schweig.*

Peronæa et Peronæoderma (sp.) *Poli.*
Azor. *Leach*, MS., 1819. } Sec. *Gray.*
Gobræus. *Id.* }
Psammocola. *Blainv.* 1824.

Generic Character. Shell equivalve, subequilateral, transversely oblong, more or less compressed, slightly gaping at each extremity; exterior generally covered with transverse or concentric striæ, and occasionally ornamented with radiating lines or ridges. Hinge composed of two teeth in one valve, and one in the other, and without lateral teeth. Sinus in the impression of the mantle large and deep. Ligament external, fulcrum prominent.

The animal has the mantle open the entire length, and bordered by a fringe of fine simple filaments; siphons long and slender, marked with longitudinal lines, and ornamented with minute cirri; a large and tongue-shaped foot, somewhat pointed.

There is no very essential distinction between this genus and *Tellina*, the greatest difference appearing to be a somewhat more oblong form of outline, and a less distinct inflexion on the posterior side of the shell, with a rather more prominent fulcrum for the ligament in *Psammobia*. In the recent state the species are, like the Tellens, inhabitants of various climes, and generally live buried in sand or gravelly mud, and they have a vertical range from low-water mark to 100 fathoms.

The name of this genus, being in fact only third in point of date, will have to be changed.

1. Psammobia Ferröensis, *Chemn.* Tab. XXII. fig. 3, *a*, *b*.

Petiver. Gazophyl., t. 94, fig. 9, 1764.
Tellina Ferröensis. *Chemn.* Conch. Cab., vi, p. 99, t. 10, fig. 91, 1782.
— Feröensis. *Broc.* Conch. Subap., p. 512, No. 6, 1814.

* Etym. ψαμμος, sand, and βιόω, to live.

TELLINA FERVENSIS. *Gmel.* Syst. Nat., p. 3235, 1788.
— — *W. Wood.* Linn. Trans., vol. vi, p. 174, t. 15, figs. 20, 21, 1802.
— RADIATA. *Da Costa.* Brit. Conch., p. 209, t. 14, fig. 1, 1778.
— INCARNATA. *Penn.* Brit. Zool., vol. iv, p. 74, pl. 47, fig. 31, 1776.
— MURICATA. *Broc.* Conch. Subap., p. 511, t. 12, fig. 2.
— TRUNCATA. *Spengler.* Fide *Lovén.*
— TRIFASCIATA. *Don.* Brit. Shells, vol. ii, pl. 60, 1800.
PSAMMOBIA FERRÖENSIS. *Lamk.* Hist. Nat. des An. s. Vert., v, p. 512.
— — *Phil.* En. Moll. Sic., vol. i, p. 23, pl. 3, fig. 7, 1836.
— — *Lovén.* Ind. Moll. Scand., p. 42, 1846.
— — *Sismonda.* Syn. An. Invert. Pedm. Foss., p. 21, 1847.
— DUMONTII. *Nyst.* Coq. Foss. de Belg., p. 103, pl. 4, fig. 12, 1844.
— LÆVIS. *Id.* Coq. Foss. de Belg., p. 104, pl. 4, fig. 13.
— MURICATA. *Id.* Coq. Foss. de Belg., p. 105.
— — ? *Grateloup.* Cat. Zool. des An. Vert. et Invert., p. 67, 1838.
— AFFINIS? *Dugard.* Mem. de la Soc. Geol. de France, tom. ii, part 2, p. 257, pl. 18, fig. 4, 1837.

Spec. Char. Testâ transvervâ, ovato-oblongâ, subæquilaterali, tenui; concentricè striatâ; anticè rotundatâ; posticè truncatâ, angulatâ, striatâ et decussatâ; margine ventrali convexiusculo; sinu palliari magno.

Shell transverse, ovately oblong, nearly equilateral, thin; concentrically striated; anterior side rounded; posterior truncated, and decussated upon the posterior slope; ventral margin slightly curved; palleal sinus large.

Length, $1\frac{7}{8}$ inch. *Height,* $\frac{7}{8}$ths of an inch.

Locality. Cor. Crag, Gedgrave, Sutton, and Ramsholt.

Recent, Britain, Mediterranean, Finmark.

This elegant shell, in its full-grown state, is rare; but small specimens and fragments are by no means scarce. I have assigned it, without a doubt, to the existing species, although some of my fossils appear rather more transverse, or have a somewhat greater length comparatively than the recent shell. My Crag specimens are particularly thin and fragile, with scarcely a trace of any muscular impression. In some of the young specimens the radiating striæ upon the angular slope of the posterior side are strongly marked with decussating lines.

This is said to have been found fossil in the Drift beds of Lancashire and Ireland.

2. PSAMMOBIA VESPERTINA, *Chemnitz.* Tab. XXII, fig. 2, *a—d.*

LUX VESPERTINA. *Chemn.* Conch. Cab., vol. vi, p. 72, t. 7, figs. 59, 60, 1782.
SOLEN VESPERTINUS. *Gmel.* Syst. Nat., p. 3228, 1788.
TELLINA VARIABILIS. *Don.* Brit. Shells, vol. ii, t. 41, fig. 2, 1800.
— GARI. *Poli.* Test. Sicil., pl. 15, figs. 19, 21, 23, vol. i, p. 41, 1791.
— — *Born.* Test. Mus. Cæs. Vind., p. 31, t. 2, figs. 6, 7, 1780.
— ALBIDA. *Dillw.* Desc. Cat. Brit. Shells, vol. 1, p. 78, 1817.

TELLINA DEPRESSA. *Penn.* Brit. Zool., ed. 4, vol. iv, p. 87, pl. 47, fig. 27.
PSAMMOBIA VESPERTINA. *Lam.* An. s. Vert., t. 5, p. 511, 1818.
— — *Phil.* En. Moll. Sic., vol. i, p. 22; vol. ii, p. 21.
— — *Lovén.* Ind. Moll. Scand., p. 42, 1846.
— — *Sism.* Syn. An. Inv. Pedm. Foss., p. 21, 1847.
PSAMMOCOLA VESPERTINA. *Blainv.* Malac., p. 77, fig. 4, 1825.
SANGUINOLARIA — *Flem.* Brit. Anim., p. 460, 1828.
CHAMA LUTESCENS. *List.* Hist. Conch., t. 417, fig. 261.
AZOR VARIABILIS. "*Leach.*" Ann. Mag. Nat. Hist., vol. xx, p. 272.

Spec. Char. Testâ oblongo-ovatâ, subinæquilaterali, concentricè striatâ, striis obtusis depressis; anticè rotundatâ, posticè subtruncatâ; margine subtilissimè crenulato.

Shell ovately oblong, slightly inequilateral, concentrically striated, striæ obtuse, depressed; anterior side rounded, posterior somewhat truncated; margin very finely crenulated.

Length, 2 inches. *Height*, 1 inch.

Locality. Cor. Crag, Ramsholt and Sudbourn.

Recent, Mediterranean, British, and Norwegian Seas.

A very few specimens only of this elegant species have fallen under my observation. I have no hesitation in assigning the smaller shell (fig. 2, *c*, *d*), found at Ramsholt, as an identity with the recent British species. Fig. 2, *a*, *b*, is the representation of a specimen found by myself at Sudbourne, and the only difference appears to be in its having somewhat larger proportions, this one measuring as much as $2\frac{5}{8}$ inches in length, and $1\frac{1}{2}$ inch high; and our fossil is in all probability only a monstrous form of the existing shell. It strongly resembles *Psam. Stangeri*, Gray, 'Faun. of New Zealand,' p. 273, No. 179.

3. PSAMMOBIA TELLINELLA, *Lamarck.* Tab. XXII, fig. 4, *a*, *b*.

PSAMMOBIA TELLINELLA. *Lamk.* Hist. des. An. s. Vert., v, p. 515, 1818.
— — *Forb.* and *Hanl.* Hist. of Brit. Moll., vol. i, p. 277, pl. 19, fig. 4, and Animal, pl. K, fig. 1, 1848.
— — *Lovén.* Ind. Moll. Scand., p. 42, No. 303, 1846.
— — *Alder.* Cat. Moll. North. and Durh., p. 89, 1848.
— FLORIDA. *Turt.* Brit. Biv., p. 86, pl. 6, fig. 9, 1822.

Spec. Char. Testâ transversâ, ovato-oblongâ, tenui; transversim striatâ; anticè ovato-rotundatâ: posticè subangulatâ; margine ventrali leviter arcuato; cardine bidentato, altera unidentato, sinu palliari profundo.

Shell transverse, ovately oblong, thin, very finely striated transversely; anterior side slightly rounded, posterior somewhat angulated; ventral margin slightly curved; hinge with one tooth in one valve, inserted between two in the other; palleal sinus deep.

Length, 1 inch.

Locality. Cor. Crag, Sutton. Recent, Channel Islands, Hebrides, and Bergen.

This delicate and elegant shell is rare in my cabinet; about half a dozen small specimens and a few fragments are all that I have seen. It much resembles the young of *Ps. vespertina*, but is rather more rounded on the posterior side, and it is a deeper or more tumid shell. The hinge teeth are small, though apparently a trifle larger than those of the recent shell. The palleal sinus is large and deep, extending inwards to a little beyond the hinge denticles. It is said to extend in the living state from the Channel Islands to the coast of Bergen, and ranges vertically from five to fifty fathoms.

TELLINA,* *Linnæus*, 1767.

PETASUNCULUS. *Rumph.* 1705. *Petiver*, 1713.
CHAMELEA (sp.) *Klein.* 1753.
PERONŒA ET PERONEODERMA (sp.) *Poli.* 1791.
TELLINARIUS (sp.) *Dum.* 1806.
ANGULUS. *Megerle*, 1811.
OMALA. *Schum.* 1817.
ARCOPAGIA. *Leach* MS. 1816. *Brown*, 1827.
PHYLLODA. *Schum.* 1817.
TELLINIDES. *Lamk.* 1818.
MACOMA. *Leach*, 1819.
LIMICOLA. *Id.* 1819. Fide *Gray*.
HOMALA. (sp.) *Agassiz*.

Generic Character. Shell transversely ovate, or suborbicular, generally inequilateral, plain or smooth, but more frequently sculptured or ornamented; posterior side more or less angulated, with an irregular flexuosity produced by a slightly sinuated form in the posterior part of the ventral margin. Hinge with generally two cardinal and two lateral teeth in each valve, the latter, in some species, are obsolete. Palleal impression deeply sinuated. Ligament external.

Animal of the form of the shell, having the mantle open in front, with the margins fringed; siphons long, sometimes four or five times the length of the shell, separate throughout, the orifices plain or indistinctly toothed; foot large, triangular, and compressed.

The character by which this genus is said to be most distinguished is the flexuous fold, or slightly twisted form of the posterior side of the shell; this, however, is not always discernible, thereby merging into *Sanguinolaria* and *Psammobia* which are characterised by the absence of the fold, and the want of lateral teeth, though in some species of this genus the latter character is by no means permanent. The outward form of *Tellina* is exceedingly variable, some species being nearly orbicular, while others are much elongated; in general the shells are slightly compressed, somewhat unequal in size, one valve being more tumid than the other, especially on the posterior side, where the ligament is placed; and this side is generally, though not always, the shorter of the two.

* Etym. Τελλίνη, the name of a mussel.

A peculiarity exists in many of the species, as well as in some of the species of its generic allies, by which a considerable variation is produced in the degree of tumidity at the posterior part of the opposite valves, causing the impression of the mantle upon the interior to display a difference in form as well as in extent; the compressed or right valve having its sinus shorter and somewhat broader or higher, while in the more tumid one it extends forward so as almost to touch the anterior adductor. This does not appear to depend upon a difference in length of the two siphons, as in some of the members of this, so called, family, which are furnished with tubes of an unequal length, this difference in the sides of the animal does not exist, and the mantle-mark is the same in both valves; but in others, in which the tubes are precisely alike, this inequality in the valves is very conspicuous; the difference in the mantle-mark appearing to be coexistent with the difference in the tumidity of the valves.

If the drawings by malacologists be correct, the inhalent siphon is the longer one in some species, while in others, this lower or indrawing tube is the shorter of the two, and apparently without producing any difference of tumidity at the posterior part of the valves. It is, however, doubtful whether a safe reliance can be placed upon the published figures of the Bivalve Molluscs, as some of the animals are represented with the upper siphon most extended, while in other very proximate species the lower projects beyond the upper one. Mr. Alder informs me these siphons are so elastic that either may be made to appear the longer at the will of the animal, which perhaps is the cause of this apparent diversity.

The inequality of proportions in the two valves gives to them a degree of obliquity, and, when viewed in a position with the animal upon its ventral margin or standing upon its foot, indicates an inflexion or incipient spirality in a dextral direction. The want of symmetry in the two valves does not pervade the whole group; for species evidently otherwise very closely allied are not possessed of this deformity.

Amongst other peculiarities of this genus may be mentioned *T. Burneti*, rather an aberrant species, brought from the Coast of California, it has its *right* valve quite flat, while the left is convex or lenticular; and in the newer Tertiaries of South Carolina there is a fossil species strongly resembling it in general form, but which differs from it in having the *left* valve the flat one. In both of these species the sinus in the mantle-mark is large and deep, but is unlike that of our other unsymmetrical shells in being of the same form and magnitude in both valves.

Notwithstanding the great curtailment of this genus since its original establishment by Linnæus, it still contains a very large number of species, particularly in the recent state; and these have a wide geographical distribution, extending from the Equator to the Polar Regions, and they range vertically from low-water mark to nearly 100 fathoms. The genus appears as early as the Coral Rag, with some doubtful forms in the Palæozoic Formations. In the older Tertiaries, twenty-three species have been figured and described by Mr. Edwards from the deposits of that period in this country alone, and ten were inhabitants of the seas by which the Crag was deposited.

1. TELLINA CRASSA, *Pennant.* Tab. XXI, fig. 1, *a—e.*

TELLINA CRASSA. *Penn.* Brit. Zool., ed. 4, p. 73.
— — ? *Dujard.* Mém. de la Soc. Géol. de France, t. 11, pl. 11, p. 258, 1837.
— — *Smith.* Mem. Wern. Soc., vol. viii, p. 93.
— — *Phil.* En. Moll. Sic., vol. ii, p. 23, 1844.
— — *Lovén.* Ind. Moll. Scand., p. 41, No. 296, 1846.
— — *Sismonda.* Syn. Meth. An. Inv. Ped. Foss., p. 21, 1847.
— RIGIDA. *Pulteney.* In Hutchen's Hist. of Dorset, p. 30.
— SCABRA. *Chemn.* Conch. Cab., vol. vi, t. 10, fig. 94.
— MACULATA. *Adams.* Linn. Trans., vol. iii, p. 252.
— — *Turt.* Brit. Biv., p. 108, pl. 6, fig. 7, 1822.
— OBTUSA. *J. Sow.* Min. Conch., t. 179, fig. 4.
— — *Nyst.* Coq. Foss. de Belg., p. 106, pl. 5, fig. 1, 1844.
— SUBROTUNDA. *Phil.* En. Moll. Sic., vol. i, pp. 29 and 255, 1839.
VENUS CRASSA. *Gmel.* Syst. Nat., p. 3288.
PECTUNCULUS PLANUS CRASSUS. *List.* Hist. Conch., fig. 136, 1687.
— DEPRESSIOR. *Da Costa.* Brit. Conch., p. 194, t. 13, fig. 4, right-hand figure.
ARCOPAGIA CRASSA. *Brown.* Illust. Brit. Conch., pl. 16, fig. 8, 1827.
— OVATA. *Id.* Illust. Brit. Conch., pl. 16, figs. 9, 10.
Dale. Hist. and Antiq. of Harwich, t. 11, fig. 13, 1730.

Spec. Char. Testâ crassâ, ovato-ellipticâ, transversâ, depressâ, utrinque æqualiter rotundatâ; latere postico breviore; lineis creberrimis, elevatis, lamelliformibus ornata.

Shell thick, ovate or elliptical, transverse, depressed both sides, equally rounded; posterior one the shorter, ornamented with elevated close set ridges or lamellæ.

Length, 2 inches. *Height*, 1½ inch.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton, Walton Naze.
Mam. Crag, Chillesford.
Clyde Beds. (*Smith.*) Recent, Britain, Coast of Scandinavia.

This shell is rare in the Coralline, but it becomes abundant in the Red Crag, at Sutton, though very scarce at Walton Naze. There is a slight flexuous fold on the posterior margin, produced by the small sinus in the margin; and the exterior is covered with numerous raised ridges forming obtuse lamellæ, scarcely reflexed; between these are fine, distinct, radiating or interstitial striæ; the right valve is the more tumid of the two. The palleal sinus is large and deep, with an upward direction extending more than half way across the shell; the adductor muscle marks are deeply impressed, particularly the anterior one, within which is a thickened obtuse ridge from beneath the umbo to the lower part of the adductor. Old shells are often thickened on the inside, thereby deepening the muscular impressions.

The figure of *T. subrotunda*, Des. 'Coq. Foss. des Env. de Paris,' tom. i, p. 81, pl. 12, figs. 16, 17, strongly resembles this species, and is considered as identical by Philippi;

but in the description by M. Deshayes, that author says it differs from *T. crassa*, Penn., in having only one lateral tooth, and the concentric striæ are finer; there is no mention of any insterstitial striæ, nor of the thickened internal ridge on the anterior side. *T. obovata*, F. Edwards, 'Geol, Journ.,' No. 11, p. 49, pl. 2, fig. 2, resembles our shell in outline, and may probably, when more specimens have been obtained, and it becomes better known, be the same as *T. subrotunda* of Deshayes; but until a fair comparison be instituted, *T. crassa* can scarcely be considered as dating its specific existence from the Older Tertiaries.

This species has a range in depth extending from low-water mark to below 50 fathoms, and its favorite habitat is in gravelly sand. It is found fossil in the Belgian Crag, and in the newer Tertiaries of Calabria, but it is not known as a living species in the Mediterranean.

Tab. III, fig. 18, 'Phil. En. Moll. Sic.,' called *T. radula*, is probably this species.

2. TELLINA BALAUSTINA, *Linnæus*. Tab. XXI, fig. 4, *a—d*.

TELLINA BALAUSTINA.	*Linn.*	Syst. Nat., ed. 12, p. 1119, No. 61, 1767.
— —	*Poli.*	Test. Sicil., vol. i, p 49, 1791.
— —	*Phil.*	Enum. Moll. Sic., vol. i, p. 25; vol. ii, p. 21.
— —	*Forbes.*	Report Ægean. Invert., p. 180, 1843.
— TENUILAMELLOSA.	*Nyst.* et *West.*	Nouv. Rech. Coq. Foss. d'Anv., p. 7, pl. 3, fig. 6, 1839.
— —	*Nyst.*	Coq. Foss. de Belg., p. 109, pl. 4, fig. 14 *a*, *b*, 1844.
— OVALOIDES.	*S. Wood.*	Catalogue, 1840.
LUCINA BALAUSTINA.	*Payr.*	Cat. Moll. Cors., p. 43, pl. 1, figs. 21, 22, 1826.

Spec. Char. Testâ transversâ, ovatâ, convexâ, subinæquilaterali, tenui; anticè rotundatâ, posticè subangulatâ; lamellatâ lamellis erectis tenuibus, distantibus; cardine bidentato, dentibus lateralibus magnis.

Shell transverse, ovate, convex, slightly inequilateral, thin; anteriorly rounded, posteriorly subangulated; covered with distant, thin, erect lamellæ; hinge with two cardinal teeth and large lateral teeth.

Length, $\frac{5}{8}$ths. *Height*, $\frac{1}{2}$ an inch.

Locality. Cor. Crag, Sutton. Recent, Ægean, Mediterranean, and British.

Very few specimens of this delicate and pretty species have fallen to my researches, and those are all from one locality. The exterior is ornamented with very fine and numerous concentric striæ, and distant, sharp, elevated ridges or lamellæ; the last are so thin that many of them are rarely left upon the surface; the posterior side is the smaller, slightly truncated, or rather biangulated, with an incipient fold very far back; the right valve has two cardinal teeth, posterior one the larger and subbifid; two lateral teeth nearly equidistant, anterior one large, the other nearly obsolete;

left valve with one cardidal subbifid tooth, and elevated dorsal margins to interlock with the lateral teeth of the opposite valve. One side of the right valve is somewhat compressed, causing thereby a difference of form in the siphonal scar.

The nearest approach to this species that I am acquainted with is *T. lamellulata*, F. Edwards, 'Lond. Geol. Journ.,' vol. i, p. 14, pl. 23, fig. 2, but that shell seems rather more equilateral, flatter, and less truncated, with more numerous elevated lamellæ. M. Edwards' specimens are not in very good preservation.

3. TELLINA OBLIQUA, *J. Sowerby*. Tab. XXI, fig. 7, *a—d*.

TELLINA OBLIQUA. *J. Sow.* (not *Lamk.*) Min. Conch., t. 161, fig. 1, 1817.
— — *Nyst.* Coq. Foss. de Belg., p. 107, pl. 5, fig. 2, 1844.
— — *Lyell.* Elem. of Geol., 2d ed., p. 299, fig. 14, 1841.

Spec. Char. Testâ subrotundatâ, obliquâ inæquilaterali, crassâ, lævigatâ vel irregulariter striatâ; anticè rotundatâ; posticè truncatâ, subangulatâ; cardine bidentato, dentibus lateralibus obsoletis.

Shell rather rounded, oblique, inequilateral, thick, and strong; anterior side rounded; posterior truncated or subangulated, smooth, or covered with irregular lines of growth; hinge with two cardinal teeth, lateral teeth obsolete.

Length, 1⅝ inch. *Height*, 1⅝ inch.

Locality. Cor. Crag, Sudbourn, Ramsholt.
Red Crag, Sutton, Bawdsey, Felixstow, Ipswich.
Mam. Crag, Chillesford.

This shell first appears in the lower or Coralline Crag, where it is not very abundant; in the succeeding period, or Red Crag, it may be found in most localities. The species may be called obliquely circular, or rather lenticular, the height being very nearly if not quite equal to the length; the valves are somewhat tumid, and covered with irregular lines of growth, and the posterior side is rather the shorter of the two, with the fold very far back; this side is compressed in the right valve, but tumid in the left; the inequality of the two valves at that part having relation to the unequal magnitude of the siphonal scar in the different valves; the lateral teeth may be said to be wholly wanting, as in the proximate genus *Psammobia*.

4. TELLINA LATA, *Gmelin*. Tab. XXI, fig. 6, *a—d*.

TELLINA LATA ALBA. *List.* Hist. Conch., fig. 253, 1686.
— LATA. *Gmel.* 1788. (Not *Quoy* and *Gaim.*) Fide *Lovén.*
— — *Midden.* Sibiria Reise, vol. ii, part 1, pl. 23, figs. 4, 5.
— — *Lovén.* Ind. Moll. Scand., p. 41, 1846.

TELLINA OVATA. *J. Sow.* Min. Conch., t. 161, fig. 2, 1817.
— — *Phil.* En. Moll. Sic., vol. i, p. 30 ; vol. ii, p. 23.
— — *Nyst.* Coq. Foss. de Belg., p. 108, pl. 5, fig. 3, *a*, *b*, 1844.
— OVALIS. *Woodw.* Geol. of Norf., p. 43, pl. 2, fig. 11, 1832.
— SABULOSA. *Spengler.* Sec. *Lovén.*
— CALCAREA. *Wahlenb.* Sec. *Lyell.* Geol. Trans., vol. vi, 2d series, p. 137, pl. 16, figs. 9—11, 1839.
— — *Möller.* Ind. Moll. Groenl., p. 20, 1842.
— PROXIMA. *Smith.* Mem. Wern. Soc., vol. viii, p. 105, pl. 1, fig. 21, 1838.
— — *Sow.* Append. Beechey's Voy., p. 154, t. 44, fig. 4, 1839.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 307, pl. 21, fig. 1, 1848.
— EDENTULA. ? *Brod.* and *Sow.* Zool. Journ., vol. iv, p. 363, 1829.
— — ? *Gray.* App. Beech. Voy. Zool., p. 154, t. 41, fig. 5 ; and t. 44, fig. 7, 1839.
— SORDIDA. *Couthony.* Bost. Journ. Nat. Hist., vol. ii, p. 59, pl. iii, fig. 11, 1839.
— TRIANGULARIS. *Lyell.* Phil. Trans., 1835, p. 36, fide *Lovén.*
— TENERA. *Gray.* List Brit. Moll., p. 42, 1851.
SANGUINOLARIA SORDIDA. *Gould.* Invert. Massach., p. 67, 1841.
MACOMA TENERA. *Leach.* Ann. of Phil., vol. xiv, p. 204, 1819.

Spec. Char. Testâ ovatâ, transversâ, inæquilaterali ; anticè longiore rotundatâ ; posticè sub-angulatâ ; dentibus utrinque binis, lateralibus nullis.

Shell ovate, transverse, inequilateral ; anterior side the longer and rounded ; posterior obtusely angulate, with two teeth in each valve; lateral teeth none.

Length, 1¾ inch. *Height*, 1¼ inch.

Locality. Red Crag, Sutton.
Mam. Crag, Bramerton, Chillesford.
Clyde Beds, Uddevalla, Russia, Canada.
Recent, Finmark, N. E. Coast of America, Britain, Behring's Straits (*G. B. Sowerby*).

I have never seen the present species from the Older or Coralline, and only rarely from the Red Crag, and never at Walton-on-the-Naze. In the Mammaliferous Crag Period the two species appear to be more equally distributed, although the oblique form is there giving way to its more transverse successor, while this latter species only, remains at the present day, and seems to be restricted to the colder regions of the Northern Hemisphere. In this, as in the preceding species, there is a considerable difference in the form and depth of the siphonal scar in the two valves, and the posterior side of this one is much more pointed than that of *obliqua*, and the line of the ventral margin is not only less curved but is somewhat constricted on the posterior side. *T. lata*, Middendorff, 'Malac. Ross.,' found in the Arctic Seas and Behring's Straits, may probably be a dwarf variety of our shell, connecting it with *T. Balthica*, which it resembles in many of its characters.

5. TELLINA BENEDENII, *Nyst* and *Westendorp*. Tab. XXI, fig. 2, *a—d.*

TELLINA ZONARIA. *Nyst*, (not *Lamk.*) Rech. Coq. Foss. Prov. d'Anv., p. 14, 1836.
— BENEDENII. *Nyst* et *West.* Nouv. Rech. Coq. Foss. d'Anv., p. 7, No. 13, pl. 2, fig. 5 bis; pl. 3, fig. 5, 1839.
— — *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ ovatâ, subæquilaterali, æquivalvi, complanatâ, lævigatâ, crassâ; anticè rotundatâ; posticè angulatâ, subacuminatâ, valvâ alterâ dente cardinali duo; impressione palliari magno.

Shell ovate, slightly inequilateral, equivalved, compressed, smooth, and thick; anterior side rounded; posterior angulated, and somewhat pointed, two cardinal teeth in each valve; palleal sinus large.

Length, 2 inches. *Height*, $1\frac{1}{2}$ inch.

Locality. Red Crag, Sutton.

My cabinet contains a single specimen of each valve, which are all that I have seen. This species somewhat resembles *T. prætenuis*, from which, however, it may be readily distinguished. The umbo is somewhat prominent, it has a thickened hinge furnished with two cardinal teeth in each valve, one small and simple, the other bifid; the simple one is posterior in the left valve, anterior in the right; besides which there is an obtuse lateral tooth on the anterior side of the left valve, and a corresponding depression on the anterior dorsal slope in the right, for its reception; the adductor muscles are large and deep, and the sinus in the mantle is of an elliptical form, extending about two thirds across the shell.

The valves have a small and general convexity, and there is no tumid swelling on the one side, or compression on the other, hence the similarity in the siphonal scar; the surface is smooth(?), but may have been worn so; and there are traces of the brownish coloured zones, which M. Nyst speaks of as ornamenting the Belgian fossil.

6. TELLINA PRÆTENUIS, *Leathes' MSS.* Tab. XXI, fig. 5, *a—c.*

TELLINA PRÆTENUIS (*Leathes'* MS.) *Woodw.* Synop. Tab. Brit. Organ. Rem., p. 11, 1830.
— — *Woodw.* Geol. of Norf., t. 2, fig. 12, 1832.

Spec. Char. Testâ ovato-trigonâ, inæquilaterali, tenui, lævi; anticè majore, rotundatâ, et convexiusculâ; posticè biangulatâ, subrostratâ, et compressâ; cardine bidentato; dentibus lateralibus nullis.

Shell ovato-trigonal, inequilateral, thin, and smooth; anterior side the larger, rounded, and somewhat convex; posterior biangulated, rather pointed, and compressed; hinge with two cardinal but no lateral teeth.

Length, $1\frac{3}{4}$ inch. *Height*, $1\frac{1}{4}$ inch.

Locality. Red Crag, Sutton, Walton Naze.
Mam. Crag, Bramerton, Postwick, and Chillesford.

This shell in some parts of the Red Crag is exceedingly abundant, though rare at Walton on the Naze. At Sutton I have frequently found specimens with the valves united and the ligament preserved, strong presumptive evidence of their having lived and died in the locality wherein they were found.

This species was named by the late Rev. G. R. Leathes, in consequence of its connexion or resemblance to *T. tenuis*, perhaps its nearest relative. It is somewhat in form like *T. Balthica*, but is not so tumid or thick: it differs from *T. tenuis* in having more height, with a greater convexity in the ventral margin; the two teeth in each valve are alternately simple and bifid, the bifid one is anterior in the left valve, and vice versa; and there are no lateral teeth, but there is a very distinct one on the anterior side in *T. tenuis*, and in that species the mantle mark is comparatively larger.

In well-preserved specimens, the surface is covered with fine concentric striæ, or lines of growth, more especially upon the posterior slope, and the right valve is the more tumid of the two; there is also a slight difference in the magnitude of the palleal sinus in the opposite valves.

The shell which really makes the nearest approach to this species is one that was brought from the S. E. Coast of Australia.

7. TELLINA BALTHICA, *Linnæus*. Tab. XXII, fig. 1, *a*—*c*.

TELLINA BALTHICA. *Linn.* Syst. Nat., ed. 12, p. 1120, No. 68.
— — *Born.* Test. Mus. Cæs. Vind., p. 38, t. 11, fig. 14, 1780.
— — *Phil.* En. Moll. Sic., vol. i, p. 28; and vol. 2, p. 22.
— BALTICA. *Lyell.* Phil. Trans., 1835, p. 34, var. *a*, pl. 11, figs. 1, 2; var. *b*, figs. 3, 4.
— SOLIDULA. *Pulteney.* In Hutchin's Hist. Dorset, p. 29.
— — *Woodw.* Geol. of Norf., pl. 2, fig. 13, 1832.
— — *Lovén.* Ind. Moll. Scand., p. 41, 1846.
— — *Middend.* Mal. Ross., loc. cit., p. 577, 1849.
— RUBRA. *Da Costa.* Brit. Conch., p. 211, t. 12, figs. 4, 4, 4.
— CARNARIA. *Penn.* Brit. Zool., vol. iv, p. 88, pl. 49, fig. 32.
— — *J. E. Gray.* List of Brit. Moll., p. 41, 1851.
— ZONATA. *Gmel.* Syst. Nat., p. 3238, No. 52.
— INCONSPICUA. ? *Brod.* and *Sow.* Zool. Journ., vol. iv, p. 363, 1829.
— — ? *Gray.* Zool. Beechey's Voy., p. 153, t. 41, fig. 6, 1839.
— GROENLANDICA. (*Beck.*) *Lyell.* Trans. Geol. Soc., vol. vi, 2d series, pl. 16, fig. 8, 1839.
PSAMMOBIA FUSCA. *Say.* Journ. Acad. Nat. Sc., v, p. 220.
— SOLIDULA. *Turt.* Brit. Biv., p. 95, t. 8, fig. 2, 1822.
SANGUINOLARIA FUSCA. *Conrad.* Am. Mar. Conch., 34, pl. 7, fig. 1.
— — *Dekay.* Nat. Hist. New York (Zoology), pl. 32, fig. 304.
LIMICOLA CARNARIA. "*Leach.*" Sec. *Gray.*

Spec. Char. *Testâ orbiculato-ovatâ, tumidâ solidulâ; anticè rotundatâ, posticè subangulatâ; cardine bidentato, dentibus lateralibus nullis.*

Shell roundly ovate, tumid, thick, and strong; anterior side rounded, posterior somewhat angulated; cardinal teeth two, lateral teeth none.

Length, $\frac{6}{8}$ inch. *Height*, $\frac{5}{8}$ inch.

Locality. Mam. Crag, Bramerton, Weybourne, Bridlington, Dalmuir, Russia, Canada.

Recent, Britain, Baltic, N. E. Coast of America, Black Sea.

I have not seen this shell from the Red Crag; as it is, however, an estuary species, it is less likely to be there. In the recent state, it is often found high up in our rivers, where the water is nearly fresh when the tide is out. The shells grow large and thick in muddy localities, and thinner and more delicate in sandy places.

Tellina, is probably its most appropriate place, although the entire absence of lateral teeth does not strictly accord with the diagnosis of this genus, but it corresponds with it in all other respects.

Fig. 1 *a*, *b*, is the representation of a shell from Clacton, where I obtained it from the Clay in which *Unio littoralis* is found in abundance; and upon some of my specimens of *Unio* are several barnacles, evidently showing the close proximity of the sea to this fresh-water deposit when it was formed.*

I have myself obtained only few specimens of the fossil from Norfolk, but I am informed it is not rare.

8. Tellina fabula, *Gronovius.* Tab. XXI, fig. 3.

Tellina fabula.	*Gron.*	Zoophyl. Gronov., p. 263, No. 4, pl. 18, fig. 9, 1781.
—	—	*Phil.* Enum. Moll. Sic., vol. i, p. 26, t. 3, fig. 10, 1836.
—	—	*Lyell.* Mag. Nat. Hist., vol. iii, new series, p. 327, 1839.
—	—	*G. B. Sow.* Thesau. Conch., vol. i, p. 287, pl. 57, fig. 62.
—	—	*Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 302, t. 19, fig. 9.
—	discors.	*Pulteney.* Hutchin's Dorset, p. 54.
—	semistriata.	*Solander*, ex *Montague.*

Spec. Char. "*Testâ elongato-ovatâ, compressâ, transversâ subinæquilaterali, tenui; posticè attenuatâ, subrostratâ, anticè majiore rotundatâ; valvula sinistra lævi, dextrâ obliquè striatâ; cardine bidentato, dentibus lateratibus parvis.*"

Shell transversely elongato-ovate, compressed, sub-inequilateral, thin; posterior side narrow, and somewhat pointed; anterior broader, larger, and rounded; left valve

* At Clacton I have also obtained *Mytilus edulis*, *Cardium edule*, and *Trigonella plana*, and also a rolled specimen of *Melania inquinata* (*Cerithium melanioides*, Sow.).

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smooth; right valve covered with oblique striæ; hinge with two cardinal teeth, and small lateral tooth.

Length, $\frac{3}{4}$ inch. *Height*, $\frac{1}{4}$ inch.

Locality. Mam. Crag, Southwold. Recent, British Seas, Mediterranean.

One specimen was found by Captain Alexander some years since, but it is now unfortunately lost. I am, however, certain of its existence as a Crag shell, and have in consequence given the representation of a recent individual.

Philippi gives it as a living species in the Mediterranean, but not as a fossil from that part of the world. He places it in his section of the genus "*dentibus lateralibus carentes.*" It is not, however, strictly speaking, destitute of lateral teeth; there is a distinct and proximate one on the anterior side of the right valve, and another smaller, but more remote, on the posterior margin, immediately beyond the ligamental fulcrum. The right valve is prettily ornamented with numerous oblique striæ, placed close and straight on the siphonal side, and are rather more distant and wavy on the anterior half.

This I have found in the recent state on the sandy shores of the Eastern Coast of England, and almost within the reach of fresh water. It is usually a littoral species, and is said to range to the depth of ten or twelve fathoms.

9. TELLINA DONACINA, *Linnæus*. Tab. XXII, fig. 5, *a*, *b*.

TELLINA DONACINA. *Linn.* Syst. Nat., ed. 12, p. 1118, No. 59, 1767.
— — *Phil.* En. Moll. Sic., vol. i, p. 24; vol. ii, p. 21.
— — ? *Dujard.* Mem. Geol. Soc. Fr., tom. ii, part 2, p. 258, 1837.
— — *Desh.* Exped. Scient. Alg. Moll., pl. 69, figs. 1—3.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 292, pl. 20, figs. 3, 4; and pl. K, fig. 4, 1848.
— — *Middend.* Malac. Rossica, p. 576, 1849.
— TRIFASCIATA. *Penn.* Brit. Zool., ed. 4, vol. iv, p. 75, No. 33.
— VARIEGATA. *Poli.* Test. Sicil., vol. ii, p. 45, t. 15, fig. 10.
— SUBCARINATA. *Broc.* Conch. Foss. Subap., p. 512, t. 14, fig. 5, 1814, fide *Phil.*
— LLANTIVYI. *Payr.* Cat. Moll. Cors., p. 40, pl. 1, figs. 13, 14, 1826.
— LUSORIA. (*Say.*) fide *Lyell.* Proc. Geol. Soc., vol. iv, part 3, p. 555, 1845.
DONAX STRIATELLA. *Nyst.* Coq. Foss. Belg., p. 116, pl. 4, fig. 15 *a*, *b*, 1844.

Spec. Char. Testâ transversâ, elongatâ, vel ovato-oblongâ, compressiusculâ, tenuissimè striatâ, inæquilaterali, latere postico breviore, obtusè angulato; impressione palliari magno profundo.

Shell transverse, elongate, subtrapezoidal, somewhat compressed, inequilateral, and finely striated; posterior side the shorter, obtusely angulated; impression of the mantle large and deep.

Length, $\frac{6}{8}$ inch. *Height*, $\frac{3}{8}$ inch.

Locality. Cor. Crag, Sutton.
Clyde Beds. Recent, Britain, Mediterranean, and North Seas. (*Midd.*)

This species is exceedingly abundant in the Coralline Crag, but I have seen it only in one locality. The palleal impression is very large and deep, extending inwards until it almost touches a sort of ridge or thickening of the shell between it and the impression of the anterior adductor; the lateral teeth are at unequal distances: two obtuse ridges diverge from the umbo to the ventral margin on the siphonal side, most distinct in the right valve, upon the interior of full-grown specimens; in the left, these markings, instead of being in relief, are impressed. Upon some of my fossils there are the remains of continuous coloured bands, not intercepted by white radiations. None of my Crag specimens have attained to so great a magnitude as is given to the recent British shell, my largest scarcely reaching three fourths of an inch in length. This has been well named: it strongly resembles a *Donax* in all its characters.

A specimen, in the cabinet of Sir Charles Lyell, has the locality of Bramerton attached to it.

10. TELLINA DONACILLA, *S. Wood.* Tab. XXII, fig. 6, *a*, *b*.

TELLINA DONACILLA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ transversâ, ovato-oblongâ, subinæquilaterali, compressiusculâ, politâ; posticè breviore, truncatâ, biangulatâ; anticè rotundatâ; cardine bidentato; dentibus lateralibus duobus.

Shell transverse, ovately oblong, somewhat inequilateral, compressed, glossy; posterior side the shorter, truncated, and biangulated; anterior side rounded; two cardinal, and two lateral teeth.

Length, $\frac{11}{16}$ inch. *Height*, $\frac{3}{8}$ inch.

Locality. Cor. Crag, Sutton.

This shell appears to be rare, one specimen of each valve, in my own cabinet, are all that I have as yet seen. It very much resembles in outline *T. Oudardii*, Payr., 'Moll. Cors.,' p. 40, pl. 1, fig. 16—18, and I had considered it different, in consequence of the want of the peculiarly characteristic marks of that species, which has the exterior, as stated by the author, beautifully ornamented with lozenge-shaped cancellæ, formed by radiating striæ intersecting the lines of growth. If these lines be upon the recent shell and not alone in the epidermis, our fossil does not possess them. The surface is covered with some broad and flat obsolete ridges on the body of the shell, which are sharp and elevated upon the posterior slope. It is flatter than *T. donacina*, less inequilateral, and has not the fine and regular striæ of that species. It also somewhat resembles the figure of *T. compressa*, Broc., pl. 12, fig. 9; and may possibly belong to one of the Mediterranean or Subappennine species, but I have not been able to obtain specimens for comparison.

Our shell has two diverging cardinal teeth in the right valve, with one large,

elongated, lateral tooth on the anterior side, and one lateral tooth on the posterior slope, beyond the large and prominent fulcrum for the ligament; this fulcrum is so conspicuous, as almost to justify the species being placed in the genus *Psammobia*, and forms one of the links that so closely unite that genus with *Tellina*. The left valve has one large triangular cardinal tooth, and a rudimentary one behind it, with corresponding elevations or teeth, which fit into the lateral depressions of the right valve; and there is an obscure diagonal ridge on the inside, from beneath the umbo towards the anterior side of the ventral margin. The palleal scar is not well defined in our shell, but is probably very large and deep.

Tellina tenuis is enumerated in Mr. Smith's 'List of the Clyde Fossils.'

Trigonella. *Da Costa.* 1778.

Spoonmussel. *Petiver.*
Mactra (sp.) *Gmelin.*
Mya (sp.) *Chemn.*
Tellina (sp.) *Donov.*
Ligula (sp.) *Mont.* 1808.
Solen (sp.) *Olivi.*
Arenaria. *Megerle.* 1811.
Scrobicularia. *Schumacher.* 1817.
Lavignon. *Cuv.* 1817.
Lutraria (sp.) *Lam.* 1818. *Swains.* 1840.
Listera. *Turt.* 1822.
Lutricola. *Blainv.* 1824.
Amphidesma (sp.) *Flem.* 1828.
Calcinella. *Agass.* 1842.
Semele (sp.) *Woodw.* 1854.

Generic Character. Shell equivalved, subequilateral, somewhat compressed, nearly smooth. Hinge furnished with two small cardinal teeth in the right valve, and one in the left; no lateral teeth. Muscular impression ovate. Palleal sinus large and deep. Ligament small, external. Cartilage large, internal.

Animal with its mantle open, having the margins denticulated. Siphonal tubes long, slender, and disconnected, with simple orifices. Foot large, tongue-shaped, and compressed.

This genus is closely allied to *Tellina*, differing only in the arrangement of the hinge furniture. In *Trigonella* the ligament is small and external, separated from the cartilage, which is large, and placed in an expanded, spoon-shaped process. In *Tellina* the cartilage is invisible, or nearly so.

1. Trigonella plana, *Da Costa.* Tab. XXII, fig. 14, *a—c.*

Spoonmuscle. *Petiver.* Gazophylacium, t. 94, fig. 3, cap. 54, 1764.
Chama piperata Bellonii. *Aldrov.* Exsang., p. 471, 1623.
Trigonella plana. *Da Costa.* Brit. Conch., p. 200, t. 13, fig. 11, 1778.
— — *Desh.* Expéd. Sci. Algérie Moll., pl. 44 to 64.
— — *Lovén.* Ind. Moll. Scand., p. 45, 1846.
— — *Gray.* List of Brit. Moll., p. 45, 1851.
Venus borealis. *Penn.* Brit. Zool., vol. iv, p. 96, pl. 48, fig. 28.

Mya Hispanica. *Chemn.* Conch. Cab., tom. vi, p. 31, t. 3, fig. 21, 1782.
— orbiculata. *Speng.* N. H. S. Sk. H., i, p. 38, No. 13, sec. *Schum.*
— Gaditana. *Gmel.* Syst. Nat., p. 3221, 1788.
Solen callosus. *Olivi.* Zool. Adriat., p. 98, t. 4, figs. 1, a—c, 1792.
Mactra Listeri. *Gmel.* Syst. Nat., p. 3261, 1788.
— — *Woodw.* Geol. of Norf., p. 43, t. 2, fig. 7, 1833.
— piperata. *Gmel.* Syst. Nat., p. 3261, 1788.
— compressa. *Mont.* Test. Brit., pp. 96 and 570, 1803.
Ligula compressa. *Mont.* Test. Brit. Supp., p. 23, 1808.
Tellina plana. *Don.* Brit. Shells, pl. 64, fig. 1, 1801.
Lutraria compressa. *Lamk.* An. s. Vert., tom. v, p. 469, 1815.
Listera compressa. *Turt.* Brit. Biv., p. 51, pl. 5, figs. 1, 2, 1822.
Lutricola compressa. *Blainv.* Malac., pl. 77, fig. 2, 1825.
Amphidesma compressum. *Flem.* Brit. An., p. 432, 1828.
— transversum? *Say.* Amer. Conch., pl. 28, mid. fig.
Lavignon calcinella. *Recluz.* Illust. Conch. p. 8, pl. 1, fig. 1.
Scrobicularia arenaria. *Schum.* Essai d'un Nouv. Syst. des Vers., p. 127, pl. 8, fig. 3, *a*, *b*, 1817.
— piperata. *Phil.* En. Moll. Sic., vol. ii, p. 8, 1844.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 326, pl. 15, fig. 5; and pl. K, fig. 6, 1848.
— plana. *Alder.* Cat. Moll. North. and Durh., p. 90, 1848.
Abra Listeri. "*Leach*," 1819. Ann. and Mag. Nat. Hist., 1847, vol. xx, p. 272.
La calcinelle. *Adans.* Senegal, p. 232, t. 17, fig. 18, 1757.

Spec. Char. Testâ ovatâ, transversâ, compressâ, subæquilaterali, concentricè striatâ; cardine bidentato; sinu palliari magno, profundo.

Shell ovate, transverse, compressed, nearly equilateral, concentrically striated; hinge with two teeth; palleal sinus large and deep.

Length, 1½ inch. *Height*, 1⅛ inch.

Locality. (?) Red Crag, Sutton.
Mam. Crag, Bramerton, Chillesford.
Clyde Beds. Recent, Mediterranean, Britain, and Scandinavia.

One specimen only of this long-known and common recent species was found by myself, many years ago, and, I think, in the Red Crag at Sutton. I believe it is not rare in the neighbourhood of Norwich. As the living species is subject to considerable variation in its outward form, there is no difficulty whatever in finding the exact resemblance of our fossil among recent specimens. The habits of the living animal lead it almost exclusively to the estuary portion of the sea, which may perhaps be a reason why it has not been more frequently met with. I have obtained one specimen from Clacton, in association with *Unio*, *Cardium*, *&c.* There is a slight difference in the tumidity of the two valves, causing thereby a difference in the palleal impression, like that in some of the *Tellens*.

Abra,* *Leach.* 1819.

Tellina (sp.) *Poli.* 1791. *J. Sow.*
Ligula (sp.) *Mont.* 1803.
Amphidesma (sp.) *Lamk.* 1818.
Abra. *Risso,* 1826. *Gray,* 1851.
Mactra (sp.) *W. Wood,* 1825.
Erycina (sp.) *Phil.* 1836.
Syndosmya. *Recluz,* 1843. *Lovén,* 1846. *Forbes* and *Hanley,* 1848.
Cummingia (sp.) *G. B. Sow.*

Generic Character. Shell thin, transversely elongate, more or less inequilateral; surface smooth, and in the recent state covered by an epidermis. Hinge furnished with one or two small cardinal, and two distinct lateral teeth; cartilage placed in an oblique, spoon-shaped process, projecting inward; ligament small, external.

Animal of the form of the shell, with the edges of its mantle disconnected throughout, and finely fringed; siphons sometimes very long, slender, and separated the entire length, with simple orifices; foot large, and somewhat geniculated or bent.

This genus is closely allied to the preceding one, the ligament and cartilage being distinctly separated; but it differs otherwise in the arrangement of the hinge, the shells of this group being furnished with distinct lateral teeth.

The shells are generally small, thin, and colourless, with an unequal degree of tumidity in the two valves on the posterior portion, and a difference in form, consequently, in the sinus of the mantle mark.

In the recent state, the species live in sand and mud, have a vertical range of 150 fathoms, and extend from the coast of Norway to the Mediterranean.

1. Abra alba, *W. Wood.* Tab. XXII, fig. 10, *a*, *b*.

Mactra alba. *W. Wood.* Linn. Trans., vol. vi, pl. 16, figs. 9—12, 1802.
— Boysii. *Mont.* Test. Brit., p. 98, pl. 3, fig. 7, 1803.
Tellina pellucida? *Broc.* Conch. Foss. Subap., p. 514, t. 12, fig. 8, mala.
Ampidesma Boysii. *Turt.* Brit. Biv., p. 53, pl. 5, figs. 4, 5, 1822.
— — *Smith.* Mem. Wern. Soc., vol. viii, p. 93.
— album. *Flem.* Brit. An., p. 432, 1828.
— semidentata? *Scacchi.* Catalogue, p. 5.
Erycina Renieri? *Phil.* En. Moll. Sic., vol. i, p. 12, t. 1, fig. 6.
Syndosmya alba. *Recluz.* Rev. Cuv. Zool., p. 362, 1843.
— — *Lovén.* Ind. Moll. Scand., p. 44, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 316, pl. 17, figs. 12—14, 1848.
Ligula Boysii? *Forbes.* Ægean. Invert., p. 180, 1843.
— alba. *Nyst.* Coq. Foss. de Belg., p. 93, pl. 3, fig. 14, 1844.
Abra — *Gray.* List. Brit. Moll., p. 43, 1851.

* Etym. ἁβρός, thin, delicate.

Spec. Char. Testâ ovatâ vel ellipticâ, tenui, lævi, inæquilaterali; latere antico majore, rotundato; latere postico angulato, subcarinato; dentibus lateralibus parvis, tenuibus; sinu palliari magno, profundo.

Shell ovate or elliptical, thin, smooth, inequilateral; anterior side the larger, and rounded; posterior angulated, and obscurely carinated; lateral teeth small, thin; palleal sinus large and deep.

Length, $\frac{1}{2}$ inch. *Height*, $\frac{3}{8}$ inch.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton, Bawdsey, Walton Naze.
Clyde Beds (*Smith*), Bracklesham (*Dixon*).
Recent, British and Scandinavian Seas.

This is abundant in the Coralline Crag, and, although a thin shell, I have found many specimens in the Red Crag at Bawdsey, some of which had the valves united. It differs from *A. tenuis* in being less equilateral, though it is more so than the succeeding species, *A. fabalis*, and on the siphonal side it preserves a sort of ntermediate character between the two, being less pointed than the one but more so than the other. There is an unequal tumidity in the two valves, causing thereby an inequality in the palleal sinus. The striæ or lines of growth are somewhat more strongly marked in this than in the succeeding species.

2. ABRA FABALIS, *S. Wood.* Tab. XXII, fig. 12, *a*, *b*.

Spec. Char. Testâ ovatâ, vel elongato-trapezoidali, inæquilaterali, tenui, fragili, lævi; latere antico longiore, rotundato; latere postico angulato; margine ventrali arcuato; dentibus lateralibus elongatis; foveâ ligamenti mediocre.

Shell ovate, or elongately trapezoidal, inequilateral, thin, fragile, and smooth; anterior side the longer, and rounded; posterior angulated; ventral margin curved; lateral teeth thin and elongated; ligamental area moderate.

Length, $\frac{3}{4}$ inch. *Height*, $\frac{1}{2}$ inch.

Locality. Red Crag, Walton Naze.

This shell presents so great a difference to the preceding (*alba*) as to entitle it, in my opinion, to an isolated position; being more elongated and slender, with the posterior side more pointed, and it also is a thinner shell, with a more delicate and less pronounced dental apparatus; less elongated than *A. prismatica*, but intermediate between the two, differing, however, from *A. intermedia* in being much more inequilateral, that shell having the umbo nearly central, while in this one the anterior side is at least two thirds larger than the posterior one. Our shell somewhat resembles *Tellina longicollis*, Scacchi, *Erycina longicollis*, Philippi; but the hinge of that species is even more slender, with more elongated lateral teeth, and the support for the cartilage is smaller.

3. ABRA PRISMATICA, *Montague*. Tab. XXII, fig. 13, *a*, *b*.

LIGULA PRISMATICA.	*Mont.*	Test. Brit. Supp., p. 23, pl. 26, fig. 3, 1808.
— —	*Brown.*	Illust. Conch., Gt. Brit., pl. 14, fig. 5, 1827.
— —	*Forb.*	Rep. Ægean. Invert., p. 181, 1843.
ABRA —	*"Leach." Lamk.*	Hist. des An. s. Vert., tom. v, p. 492, 1818.
MYA —	*Turt.*	Conch. Dict., p. 103, 1819.
SYNDOSMYA —	*Recluz.*	Rev. Cuv. Zool., p. 367, 1843.
— —	*Lovén.*	Ind. Moll. Scand., p. 45.
— —	*Forb.* and *Hanl.*	Hist. Brit. Moll., vol. i, p. 321, pl. 17, fig. 15.
TELLINA STRICTA.	*Broc.*	Conch. Foss. Subap., p. 515, t. 12, fig. 3, 1817.
— DONACIFORMIS.	*Nyst.*	Rech. Coq. Foss. d'Anv., p. 5, pl. 1, fig. 17, 1836.
LIGULA —	*Id.*	Coq. Foss. de Belg., p. 92, pl. 4, fig. 9, 1843.
AMPHIDESMA PRISMATICUM.	*Turt.*	Brit. Biv., pl. 5, fig. 3, 1822.
ERYCINA ANGULOSA.	*"Bronn." Phil.*	En. Moll. Sic., vol. ii, p. 9, 1844.

Spec. Char. Testâ elongato-ovatâ, inæquilaterali, lævigatâ, tenui; latere postico duplo breviore; subrostrato; dentibus lateralibus elongatis.

Shell elongately ovate, inequilateral, smooth, and very thin; posterior side half the length of the anterior, and pointed; lateral teeth elongated.

Length, $\frac{3}{4}$ inch. *Height*, $\frac{3}{8}$ inch.

Locality. Cor. Crag, Sutton.

Clyde Beds. Recent, Ægean, British, and Norwegian Seas.

I have met with this shell only in the Cor. Crag, and there not very abundantly. If there be any difference between this and the existing form, it is that the fossil appears rather the more tumid of the two. The ligamental area is small, and there are two small lateral denticles or dorsal elevations in the left valve, rather remote from the umbo, with one cardinal tooth; and two lateral denticles, and two cardinal teeth in the right valve; palleal impression not visible. The siphonal side is somewhat pointed and slightly compressed, forming an obscure angle or ridge on that side from the umbo to the posterior extremity. This species in the living state is said to have a vertical range of 100 fathoms, with a wide geographical extension from Norway to the Ægean, and there appears very little doubt that the fossil called *Erycina angulosa*, from the Upper Tertaries of Calabria, belongs to the same species. It is found also in the Belgian Crag of Anvers. *Ligula fragilis*, Bosquet, 'Bull. de l'Acad. Roy.,' tom. xviii, pl. 11, p. 305, fig. 1, *a*—*d*, a shell from Klein Spauwen, strongly resembles our species, but it is, I believe with that author who has pointed out the differences between the Belgian shells, quite distinct. *Amphidesma subreflexa*, Conrad, p. 37, pl. 19, fig. 6, if one might judge from the figure alone, may perhaps be united with *A. prismatica*.

4. ABRA OBOVALIS, *S. Wood.* Tab. XXII, fig. 11.

AMPHIDESMA OBOVALE. *S. Wood.* Catalogue, 1840.
ERYCINA OVATA? *Phil.* En. Moll. Sic., vol. i, p. 13, t. 1, fig. 13, 1836.
TELLINA RUBIGINOSA? *Poli.* Vol. i, p. 48, t. 15, fig. 31, 1791, sec. *Phil.*

Spec. Char. Testâ ovatâ, crassiusculâ, subæquilaterali; anticè rotundatâ, convexâ; posticè angulatâ, compressiusculâ; dentibus lateralibus magnis, elevatis, approximatis; apicibus prominulis; impressione palliari magno profundo.

Shell ovate, rather thick, nearly equilateral, smooth; anterior side rounded, somewhat tumid; posterior angulated, and slightly compressed; lateral hinge teeth large, elevated, and proximate; apices rather prominent; palleal impression large and deep.

Length, $\frac{1}{2}$ inch nearly. *Height*, $\frac{3}{8}$ inch.

Locality. Red Crag, Sutton.
Mam. Crag, near Norwich.

Only two specimens of this species have come under my observation; one was from the Mam. Crag, given to me by Mr. Charlesworth, the other I found in the Red Crag at Sutton: they are both unfortunately the right valve. Perhaps the shell described by Philippi above referred to is the same species, but the figure is by no means good, and the description does not altogether accord with the Crag shell, which is thick, and not thin, as therein described; our shell has a remarkably thick hinge and a large, angular, or spoon-shaped area for the cartilage, behind which are two small cardinal teeth, and at a little distance are two prominent angular denticles; the posterior one close to the extremity of the hinge pit; the palleal sinus is very large, extending into the shell more than two thirds of its entire length. It differs from *A. tenuis* in being more pointed, and it has a more strongly marked hinge.

A shell much resembling this species has been obtained on the N. E. Coast of America, called *Cummingia tellinoides*, Conrad, 1830, Gould, 'Invert. Massach.,' p. 56, fig. 36, and Stimpson 'Catal.,' p. 20, but it is specifically distinct. The Crag shell is not so much compressed; the ventral margin is more convex, and the lateral teeth of the hinge larger and more prominent; while the American shell is also different externally, being covered with larger and more regular ridges.

Erycina ovata, Midden, t. 19, figs. 5—8, as well as *Amphidesma ovata*, Desh. 'Expéd. Morée,' pl. 6, fig. 8, appear, from the figures and descriptions, to be different from our shell.

MACTRA,* *Linnæus*, 1767.

CALLISTA CALLISTODERMA (sp.) *Poli*, 1791.
TRIGONELLA (sp.) *Da Costa*, 1778.
MULINIA. *Gray*, 1836.
SPISULA. *Gray*, 1837; 1851.
MESODESMA (sp.) *Desh.* 1835.
HEMIMACTRA. *Swains.* 1840.

* Etym. μακτρα, a kneading trough.

Generic Character. Shell transverse, subequilateral, equivalve; ovate, elliptical, or subtriangular, sometimes thin, occasionally thick and ponderous, slightly gaping laterally; surface smooth, or finely striated concentrically. Hinge with a double cardinal tooth in the left valve, and a triangular space for its reception in the right, with large and elongated lateral teeth on each side: a large triangular pit for the cartilage. Ligament small, external. Impression by the mantle sinuated.

Animal with its mantle freely open almost as far backward as the siphons; margins fringed; siphons large and extensile, united to their extremities, and the orifices ornamented with cirri; foot long and strong, tongue-shaped, geniculated.

This genus, constituting a well marked group, has not been much dismembered since the time of its original establishment by Linnæus: a division under the name of *Spisula*, has, however, been proposed by Dr. Gray for those species which have the ligament entirely hidden by the dorsal margin, and the more complete union of the cartilage with the ligament, and he has reserved the name of *Mactra* for the species which have a small shelly plate interposed between the two portions of the ligament, and where it is partially visible when the valves are closed; this distinction is so very ill defined that it is not thought necessary the separation should be here adopted. The most distinguishing character is the possession of a sharp diverging or chevron-formed tooth, somewhat resembling the letter ∧ reversed, and this is placed immediately beneath the umbo before the cartilage. Some of the species have the lateral teeth and the sides of the sockets, into which they are inserted, covered with rugosities or ridges in a direction at right angles to these teeth; others have these parts quite smooth; the thicker species are generally furnished with those ridges, but the thinner ones are not always free or naked: these might almost constitute a sectional distinction, but the same differences are observable in the genera *Astarte* and *Cyrena*.

The species of this genus have been found in most parts of the world, living principally in shallow water; they are generally buried in the sand, within a short distance from the surface.

In the fossil state they have been obtained in the Lias and Greensand formations, and one is recorded as from the Carboniferous series; but this latter is of doubtful character. The species, as well as individuals, are largely developed in the newer Tertiaries, and are abundant also at the present day.

1. MACTRA GLAUCA, *Born.* Tab. XXIII, fig. 2, *a*, *b*.

MACTRA GLAUCA. *Born,* Test. Mus. Cæs. Vind., p. 51, t. 3, figs. 11, 12, 1780.
— HELVA SEU HELVACEA. *Chemn.* Conch., Cab., vol. vi, p. 234, t. 23, figs. 232, 233.
— HELVACEA. *Payr.* Cat. Moll. Cors., p. 29, 1826.
— — *Phil.* En. Moll. Sic., vol. i, p. 10; vol. ii, p. 9.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 366, pl. 23, fig. 2, 1848.
— NEAPOLITANA. *Poli.* Test. Sicil., vol. i, t. 18, figs. 1—3, 1791.

Spec. Char. Testâ ovatâ subtrigonulâ, subinæquilaterali, tenui, lævi, compressiusculâ; margine dorsali convexiusculo; dentibus lateralibus remotis, lævigatis, acutis, tenuibus; foveâ cardinali magnâ; sinu palliari semicirculari.

Shell ovate, slightly trigonular, nearly equilateral, thin and smooth, somewhat compressed; dorsal margin slightly curved; lateral teeth remote, smooth, sharp, and thin; cartilage pit large; palleal sinus semicircular.

Length, $3\frac{1}{8}$ inches. *Height*, $2\frac{1}{2}$ inches.

Locality. Red Crag, Newbourn. Recent, Mediterranean, British Channel.

This species, in the recent state, seems restricted to the warmer parts of the British Seas, and to the Mediterranean, and as such we might have expected to have found it in the lower Crag deposit. Two specimens were found by myself in the genuine, though rather disturbed portion of the, Red Crag: there is, I think, little doubt of its having been an inhabitant of the sea of this latter Period, as so large and thin a species would hardly have escaped destruction in a removal from one formation to another. *M. stultorum* is the shell with which it is most likely to be confounded; that species, however, never attains to so great a magnitude. The dental characters in this are strongly marked; the right valve has two unequal sized cardinal teeth, the anterior one short, inside of which the Λ-formed tooth of the left valve interlocks; the lateral teeth are long, thin and sharp, rather less elevated towards the sides than are those of *M. stultorum*, and in this species the umbo is rather more prominent: the pit for the cartilage is of a triangular form, and the mantle sinus is comparatively less.

Born seems intitled to priority, as there is very little doubt his figure, though not a good one, was intended for this species, and to which Chemnitz (who has given a much better representation) has referred.

Menke has introduced this species into his 'List of New Holland Mollusca.' This Australia shell may be what is called by some authors its representative.

2. Mactra stultorum, *Linnæus.* Tab. XXIII, fig. 3, *a—d.*

Mactra stultorum. *Gualteri.* Ind. Test. Conch., t. 71, fig. c, 1742.
Pectunculus. *Leigh.* Nat. Hist. Chesh., pl. 3, fig. 6, 1700.
Cardium stultorum. *Linn.* Syst. Nat., ed. 10, p. 681, No. 8.
Mactra stultorum. *Linn.* Syst. Nat., ed. 12, p. 1126, No. 99, 1767.
— — *Broc.* Conch. Foss. Subap., p. 535, No. 2, 1814.
— — *Phil.* En. Moll. Sic., vol. i, p. 10, t. 3, fig. 2, 1836.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 362, pl. 22, figs. 4—6.
— cinerea. *Mont.* Test. Brit. Supp., p. 35, 1808.
— magna. *Woodw.* Geol. of Norf., p. 43, t. 2, fig. 10, 1833.
— straminea? *Desh.* 2d ed. *Lamk.* tom. vi, p. 100, 1835.
Trigonella radiata. *Da Costa.* Brit. Conch., p. 196, pl. 12, fig. 3, 1778.
Tellina radiata. *Penn.* Brit. Zool., ed. 4, vol. iv, p. 87, pl. 49, fig. 30.

Spec. Char. Testâ ovatâ, transversâ, subtrigonâ, subæquilaterali, lævi, tenui; cardine bidentatâ, dentibus lateralibus acutis, elongatis; sinu palliari semicirculari.

Shell ovate, transverse, subtrigonal, slightly inequilateral, smooth, and thin; hinge with two cardinal teeth in each valve, with sharp and compressed lateral teeth; impression of the mantle with a semicircular sinus.

Length, $2\frac{1}{4}$ inches. *Height*, $1\frac{3}{4}$ inch.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton.
Mam. Crag, Bramerton.
Clyde Beds, *Smith*; Bracklesham (*Dixon*).
Recent, Mediterranean and British Seas.

A fragment only of this species is in my cabinet from the lower or Coralline Crag, and it is not by any means abundant in the succeeding or Red Crag period, but it has been found plentifully in the Mammaliferous Crag, near Norwich, and in the Clyde beds, and it has become a very common shell in our own seas.

There is considerable variation among my specimens not only in proportionate dimensions but also in the outward form. In fig. *a* the shell is almost as high as it is long, with the dorsal edge rounded; fig. *b*, is comparatively much longer, with the hinder side angulated and somewhat pointed. The impressions of the adductors are rather large, and the sinus of the mantle-mark extends inwards about $\frac{2}{5}$ths of the length of the shell. The lateral teeth are thin, double in the right valve, and the cardinal ∧-formed tooth diverges nearly at a right angle.

In the recent state it is littoral in its habits, and has a wide geographical range, extending from the south coast of Norway (*Forbes* and *Hanley*) into the Mediterranean, and it is mentioned by Philippi as having been met with by Ehrenberg in the Red Sea.

3. Mactra arcuata, *J. Sowerby.* Tab. XXIII, fig. *a—c.*

Mactra arcuata.	*J. Sow.*	Min. Conch., t. 160, fig. 1, 1817.
—	—	*Woodw.*	Geol. of Norf., p. 43, 1833.
—	—	*Nyst.*	Coq. Foss. de Belg., p. 78, pl. 11, fig. 7, 1844.

Spec. Char. Testâ ovato-trigonula, inæquilaterali, lævigatâ, subcompressâ, tenui; anticè latiore et breviore, rotundatâ; margine dorsali arcuatô; cardine bidentato, dentibus lateralibus perpendiculariter striatis; sinu palliari linguiformi.

Shell ovate, or rather ovato-trigonal, inequilateral, smooth, slightly compressed, thin; anterior side the broader, short, and rounded, dorsal margin curved; hinge with two cardinal teeth, and striated lateral teeth; pallial sinus tongue-shaped.

Length, $3\frac{1}{4}$ inches. *Height*, $2\frac{3}{8}$ inches.

Locality. Coralline Crag, Sutton, Gedgrave.
Red Crag, Walton Naze, Sutton, Bawdsey.

This species is not very abundant in the Coralline Crag; but in the native bed at Walton Naze in the Red Crag, specimens are met with in large numbers, although somewhat difficult to obtain perfect, owing to their extreme fragility. The exterior is always more or less ridged, from the unequal degree of decomposition, and the surface is never in its original condition; but, judging from those in which it is partially preserved, it was probably nearly smooth in the living state.

The ligamental area is large and simple, running close up to the umbo; and the cardinal ∧-formed tooth very small in the left valve, with a corresponding cavity in the right; the lateral teeth are double in the right valve, deeply ridged on both sides of the interior; the lateral teeth of the left valve are single, and ridged on the outside; the muscular impressions are large, not very deep seated, and the sinus in the mantle-mark is somewhat narrow, extending into the interior at least one third of its entire length, but variable, being modified by the comparative length of the shell.

4. MACTRA ARTOPTA, *S. Wood.* Tab. XXIII, fig. 4, *a*, *b*.

Spec. Char. Testâ trigonulâ vel obtusè cuneatâ; tumidiusculâ, inæquilaterali, anticè rotundatâ, margine dorsali postico rectiusculo; umbonibus subprominulis: dentibus lateralibus perpendiculariter striatis.

Shell trigonal or obtusely wedge-shaped, slightly tumid, inequilateral, anterior side rounded, dorsal margin of posterior side somewhat straight, umbones rather prominent, lateral teeth striated perpendicularly.

Length, $2\frac{1}{2}$ inches. *Height*, 2 inches.

Locality. Cor. Crag, Sudbourne.

Several specimens of a *Mactra*, contained in the collections of Mrs. Corder, Mr. Perry, and my own, appear to possess a uniformity of character, such as I think entitle them to be considered as belonging to a distinct species, differing from *M. arcuata*, which is perhaps its nearest relative, in having the dorsal margin less curved than in any specimens of that species which have come under my inspection. This shell is also rather more tumid, and it has a more elevated umbo, and its whole aspect appears different. I have seen it only from the Coralline Crag, in the neighbourhood of Orford. My specimens of *M. arcuata*, from the same Formation, were found at Ramsholt.

5. MACTRA PROCRASSA, *S. Wood.* Tab. XXIV, fig. 8, *a*, *b*.

Spec. Char. Testâ magnâ, crassâ; irregulariter striatâ, ovato-trigonulâ, inæquilaterali; anticè sub-angulatâ, posticè rotundatâ; foveâ ligamenti magnâ; dentibus lateralibus perpendiculariter striatis.

Shell large, thick and strong; irregularly striated externally, ovately triangular; inequilateral; anterior side obtusely angulated, posterior rounded; ligamental area large; lateral teeth perpendicularly striated.

Length, 2½ inches. *Height*, 2 inches.

Locality. Red Crag, Felixstow.

One specimen only of this species is all that I have seen. It is from the cabinet of Mr. Perry, and was obligingly forwarded to me for publication by Mrs. Corder.

It somewhat resembles *M. solidissima*, Chemn. (*M. gigantea*, Lamk.), but differs from that shell in being much more rounded on the posterior side. The lateral teeth in our shell are also considerably larger, and the sinus in the mantle-mark is also different; but that perhaps may depend upon, or would be modified by, the length and form of the posterior side. A shell in the British Museum, from South America, *M. exalbida*, much resembles it in form, but in this latter species the lateral teeth are smooth.

6. MACTRA TRUNCATA, *Montague*. Tab. XXIV, fig. 2, *a*, *b*.

PECTUNCULUS CRASSIUSCULUS. *List*. Hist. Conch., lib. 11, fig. 87.
MACTRA TRUNCATA. *Mont*. Test. Brit. Supp., p. 34, 1808.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. i, p. 354, pl. 23, fig. 1.
— SUBTRUNCATA. *Donov*. Brit. Shells, vol. iv, pl. 126, 1803.
— CRASSATELLA. *Desh*. 2d ed. *Lamk*. tom. vi, p. 107, No. 33, 1835.
— CRASSA. *Turt*. Brit. Biv., pp. 69, 258, t. 5, fig. 7, 1822.
SPISULA — *Gray*. Mag. Nat. Hist., new series, vol. i, p. 373, 1837.

Spec. Char. Testâ rotundato-triangulatâ, subæquilaterali crassâ; sinu palliari brevi, linguiformi; umbonibus prominentibus, dentibus lateralibus perpendiculariter striatis.

Shell roundedly triangular, subequilateral, thick; palleal sinus short, tongue-shaped; umbones prominent, lateral teeth with perpendicular striæ or ridges.

Diameter, 1¼ inch.

Locality. Red Crag, Sutton, Walton Naze.
Clyde Beds. Recent, Britain, and Scottish Seas.

This is at present a rare Crag species. A worn and somewhat injured specimen has long been in my possession; two others, in better condition, have since been obtained by Mrs. Corder, and these are all that I have seen.

7. MACTRA SOLIDA, *Linnæus*. Tab. XXIV, fig. 4, *a*—*c*.

MACTRA SOLIDA. *Linn*. Syst. Nat., ed. 12, p. 1126, 1766.
— — *Goldf*. Petr. Germ., vol. ii, p. 253, No. 1, t. 152, fig. 5.
— — *Phil*. En. Moll. Sic., vol. i, p. 11; vol. ii, p. 10.
— — *Nyst*. Conch. Foss. de Belge., p. 77, pl. 3, fig. 10, 1844.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. i, p. 315, pl. 22, figs. 1—5, 1848.

MACTRA VULGARIS. *Chemn.* Conch. Cab., vol. vi, p. 230, pl. 23, fig. 229.
TRIGONELLA ZONARIA. *Da Costa.* Brit. Zool., p. 197, pl. 15, fig. 1, 1778.
— GALLINA. *Id.* Brit. Zool., p. 199, pl. 14, fig. 6.
SPISULA SOLIDA. *Gray.* Mag. Nat. Hist., 1837, p. 374.

Spec. Char. Testâ ovato-trigonali, subæquilaterali, crassâ, læviusculâ; dentibus lateralibus perpendiculariter striatis.

Shell triangularly ovate, slightly inequilateral, thick, nearly smooth; lateral teeth perpendicularly striated.

Length, 1 inch. *Height*, $\frac{7}{8}$ inch.

Locality. Red Crag, Sutton.
Mam. Crag, Bramerton.
Clyde Beds. Recent, Mediterranean and British Seas.

As far as I can ascertain the history of this species, it is of comparatively modern origin, although by some mistake it was quoted in my 'Catalogue' as from the Older or Coralline Crag, from which deposit I certainly have not a well-determined specimen, and those from the succeeding or Red Crag Period are somewhat doubtful.

I have one characteristic specimen from Bramerton, corresponding precisely with the common living shell, but it does not appear to have been abundant even there, as it is not enumerated among the Norfolk Shells by Woodward.

In the recent state, it is generally a littoral species, living buried in the sand, but has been found in water as deep as thirty-five fathoms (*M'Andrew*). It is an estuary species at the present day.

8. MACTRA OVALIS, *J. Sowerby.* Tab. XXIII, fig. 1, *a—d.*

MACTRA OVALIS. *J. Sow.* (not *Gould.*) Min. Conch., t. 160, fig. 5, 1817.
— DUBIA. *Id.* Min. Conch., t. 160, figs. 2, 3, 4.
— ELLIPTICA. *Brown.* Illust. Conch. Gt. Brit., pl. 15, fig. 6, 1827.
— — *Lovén.* Ind. Moll. Scand., p. 45, 1846.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 356, pl. 22, fig. 3.
— SOLIDA. *Don.* Brit. Shells, t. 61, small figure.
— CONGESTA? *Conrad.* Foss. of the Med. Tert., p. 27, pl. 15, fig. 2, 1838.
— STRIATA. *Nyst.* Coq. Foss. de Belg., p. 80, pl. 4, fig. 1 *a*, 1844.
SPISULA ELLIPTICA. *Gray.* List Brit. Moll., p. 32, 1851.

Spec. Char. Testâ ellipticâ vel ovato-angulatâ, subæquilaterali, lævigatâ, vel tenuissimè striatâ, tumidiusculâ; dentibus lateralibus rugosis; margine ventrali arcuato.

Shell elliptical or angularly ovate, nearly equilateral; smooth or very finely striated transversely; slightly tumid; lateral teeth rough or striated; ventral margin curved.

Length, 2 inches. *Height*, $1\frac{1}{2}$ inch.

Locality. ? Cor. Crag, Sutton.
Red Crag, Bawdsey, Sutton, Woodbridge.
Mam. Crag, Bramerton, Chillesford.
Clyde Beds. Recent, Finmark, Britain.

The name of *ovalis* is selected in preference to that of *dubia*, as being best suited to the character of the species, both having been proposed at the same time.

A considerable range in variation is observable in the numerous specimens found in the Red Crag, some of which very closely approach *M. solida*, so much so that I was induced to consider it in my 'Catalogue' only as a variety, more especially as in this, when perfect, the dorsal portion is marked with ridges such as are supposed to be a good distinguishing character for that species. The principal difference appears to be a greater solidity of substance in the one so named, and the other is of course thinner. Our Red Crag fossil has the exterior covered with very fine, close-set, and rather irregular striæ, while upon the upper or dorsal portion it is more strongly ridged than is usual in the recent shell. The variety *M. dubia* is less elliptical, with the dorsal portion ridged, connecting it in that character with *M. solida*, from which it differs only in being rather more oval and thinner.

In the Red Crag this is one of the most abundant shells, and may be obtained in most localities; but I have never found it at Walton-on-the-Naze.

9. MACTRA SUBTRUNCATA, *Da Costa*. Tab. XXIV, fig. 3, *a*, *b*.

TRIGONELLA SUBTRUNCATA. *Da Costa*. Brit. Conch., p. 198, 1778.
MACTRA SUBTRUNCATA. *Mont*. Test. Brit., p. 93, and Sup., p. 37, pl. 27, fig. 1.
— — *Lovén*. Ind. Moll. Scand., p. 45, 1846.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. i, p. 358, pl. 21, fig. 8; pl. 22, fig. 2; and pl. L, fig. 3, 1848.
— — ? *Midd*. Malac. Rossic., p. 581, t. 18, figs. 11—13.
— — *Sismonda*. Syn. Meth. Anim. Invert. Ped. Foss., p. 22, 1847.
— CUNEATA. *J. Sow*. Min. Conch., t. 160, fig. 7, 1817.
— — *Woodw*. Geol. of Norf., p. 43, t. 2, fig. 10, 1833.
— EUXINICA? *Krynichi*. Bull. des Not. de Moscou, No. 11, p. 63, 1837.
— LIMBATA. *Menke*. Fide *Lovén*.
SPISULA SUBTRUNCATA. *Gray*. Mag. Nat. Hist., new series, p. 374, 1837.

Spec. Char. Testâ ovato-triangulari, vel cuneiformi, inæquilaterali, crassâ: anticè breviore subtruncatâ; posticè producta, angulatâ; dentibus lateralibus perpendiculariter striatis; margine ventrali convexiusculo.

Shell ovately triangular or obtusely wedge-shaped, inequilateral, thick; anterior side the shorter, and roundedly truncate; posterior side produced, and angulated; beaks slightly prominent; lateral teeth perpendicularly striated; ventral margin slightly convex.

Length, 1 inch. *Height*, $\frac{3}{4}$ inch.

Locality. Red Crag, Sutton?
Mam. Crag, Bramerton.
Clyde Beds, Bracklesham, Uddevalla.
Recent, West Gothland, Britain, Mediterranean.

This is a common shell in the Mammaliferous Crag in the neighbourhood of Norwich. The cuneiform variety (*cuneata*) differs only in so far as to have one side a little more produced than is usual in the recent shell. The specimens are always more or less deprived of their outer coating; but in those best preserved, the ridges upon the dorsal area may be distinctly seen.

10. MACTRA OBTRUNCATA, *S. Wood*. Tab. XXIV, fig. 5, *a*, *b*.

Spec. Char. Testâ subæquilaterali, obtusè triangulari, obtruncatâ; anticè angulatâ; posticè truncatâ aut rotundatâ; umbonibus subprominentibus; areâ dorsali striatâ; dentibus lateralibus rugosis.

Shell slightly inequilateral, obtusely triangular, roundedly truncate; anterior side angular, posterior irregularly rounded; umbones slightly prominent; dorsal area striated; lateral teeth denticulated.

Length, $\frac{7}{8}$ inch, nearly. *Height*, $\frac{3}{4}$ inch.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton.

This shell is not rare either in the Red or Coralline Crag. It much resembles in form the preceding species (*M. subtruncata*), but differs essentially in being reversed. In the living species the angular or produced portion is on the side on which the ligament is placed, and where the sinuated mark of the mantle is seen; while in this, the anterior side is angulated, though not much produced. It is a thick and strong shell, somewhat tumid, with an obtuse ridge on each side, more distinctly marked on the anterior, running from the umbo to the ventral margin, within which it is slightly flattened. It has long remained in my cabinet, under the name of *M. subtruncata*, imagining it to have been only a reversed variety, like *Trophon antiquum*, var. *contrarium*, so common in the Red Crag. There appears, however, a difference also in the form and direction of the sinus in the mantle-mark, more than might be the result of a difference in the length of the siphonal sides of the two shells.

Mactra striata, Smith, 'Wern. Trans.,' vol. viii, pl. 1, fig. 22, much resembles, and may probably prove to be, this species, but I have not been able to obtain a specimen for comparison; and judging from the representation, it does not appear to have the angular form on the anterior side as in our shell. Messrs. Forbes and Hanley referred

the Stevenston shell to *M. subtruncata*, but Mr. Smith tells me it does not belong to that existing British species.

I have, therefore, proposed the above name for the Crag fossil, not only from the state of uncertainty respecting *M. striata*, but also from the consideration of the name being employed for another species.

11. MACTRA CONSTRICTA, *S. Wood.* Tab. XXIV, fig. 6, *a—c.*

Spec. Char. Testâ oblongo-ovatâ, inæquilaterali, crassâ, lævigatâ vel tenuissimè striatâ; anticè longiore, rotundatâ, posticè angulatâ; margine ventrali constricto; dentibus lateralibus perpendiculariter striatis.

Shell ovately oblong, inequilateral, thick, smooth or finely striatedcon centrically; anterior side the longer, and rounded; posterior angulated; ventral margin contracted; lateral teeth rough or perpendicularly striated.

Length, $1\frac{1}{4}$ inch. *Height*, $\frac{5}{8}$ inch.

Locality. Red Crag, Sutton.

This is a common shell, and very abundant in some localities. In its adult state it assumes a form somewhat approaching *M. deaurata*, the ventral margin on the siphonal side, after a certain period of growth, becomes contracted or constricted, and the dorsal margin then slopes suddenly, giving it an angular form. In the young shell, as indicated by the lines of growth, it has the oval shape of *ovalis*, and I considered it as a variety only of that species; but in many of the species of this genus it is very difficult to determine to which the immature shell belongs, and I have now reason to believe this to be entitled to specific distinction. *Mactra Caspia*, Eichwald (a Tertiary fossil), 'Fauna Caspio-Caucasia, p. 261, t. 38, figs. 21, 22, has some resemblance to our shell; but it appears to be more equilateral, and too regular in form, without the contraction or distortion of the Crag specimens.

I have been unable to obtain any information respecting the specimen figured by Woodward, called *M. triangularis*, 'Geol. of Norf.,' t. 2, fig. 9, though most obligingly aided in the search by my collecting friends in Norwich.

12. MACTRA DEAURATA, *Turton.* Tab. XXIV, fig. 7, *a, b.*

MACTRA DEAURATA. *Turt.* Brit. Biv., p. 71, t. 5, fig. 8, 1822.
— DENTICULATA. *W. Wood.* Ind. Test. Supp. Mactra, pl. 1, fig. 9.
— MODICELLA? *Conrad.* Sillim. Journ., vol. xxiii, p. 340.
— — *Id.* Foss. Med. Tert., p. 25, pl. 13, fig. 3, 1838.
— INEQUILATERA. *Nyst.* Conch. Foss. Belg., p. 79, pl. 11, fig. 8, 1844.

MESODESMA JAURESII. *De Joannis.* Mag. de Zool. Moll., pl. 54, 1834.
— — *Gould.* Invert. Massach., pl. 58, fig. 38, 1841.
— DEAURATA. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 346, 1848.
ERYCINA DENTICULATA. *Cuvier.* (*Griffiths.*) An. Kingd., t. 22, fig. 2.
PAPHIA DEAURATA. *Gray.* List Brit. Moll., p. 157, 1851.

Spec. Char. Testâ transversâ, oblongo-ovatâ, inæquilaterali, crassa; transversè striatâ vel subimbricatâ; anticè longiore et rotundatâ; posticè truncatâ; cardine bidentato; dentibus lateralibus magnis, striatis.

Shell transverse, ovately oblong, inequilateral, thick and strong, transversely or concentrically striated; anterior side the longer, and rounded; posterior truncated; lateral teeth large, and perpendicularly striated.

Length, 1¼ inch. *Height,* ¾ inch.

Locality. Red Crag, Sutton, Walton Naze.

Recent, North-east Coast of America, Newfoundland.

The specimen figured was found at Walton-on-the-Naze by John Brown, Esq., of Stanway. There is another in my own cabinet, from the Red Crag at Sutton, but not in quite so good a state of preservation. It may be thus more fully described: The anterior side is much produced, the base line of the shell ascending towards the extremity, where it is roundedly pointed, while the siphonal side is very short, and obtusely biangulated; the surface is covered with irregularly elevated lines of growth or ridges; corresponding with the figure and description given by Turton, who says it somewhat resembles in outline *M. dealbata,* but differs in being thicker, and also in the teeth, though he does not tell us what these latter are like in either species.

The recent shell is placed by some authors in the genus *Mesodesma.* A small ∧-formed tooth is present in this left-hand specimen, placed immediately before a large ligamental area, as in *Mactra,* with elongated lateral teeth, which are striated.

LUTRARIA,* *Lamk.* 1799,

MACTRA (sp.) *Linn.*
PSAMMOPHILA. *Leach,* MS. 1819. Fide *Brown.*
LUTRICOLA (sp.) *De Blainv.* 1824.

Generic Character. Shell transversely ovate or oblong, inequilateral, and gaping at the lateral extremities; externally smooth, or slightly striated transversely. Hinge with a prominent triangular or diverging tooth in the right valve, with a corresponding pit for its reception in the left. Ligament internal, placed in a large spoon-shaped depression in each valve. Impression by the mantle deeply sinuated.

* Etym. *Lutra?* a luto, to daub, probably from its mud-like exterior.

Animal oblong, with very elongated siphonal tubes united almost to their extremities; orifices fimbriated. Mantle open in front for the emission of a foot of considerable size.

The true position of this genus (or what is called its family connexions) is still a subject of much diversity of opinion, some placing it near to *Mya*, while others claim for it a close affinity to *Mactra*.

Few species of this genus are at present known in the recent state, and as fossils they have been recorded in the Older Secondary Formations. The true generic position of the latter is doubtful. In the Older Tertiaries it does not appear to have been found, but the middle and newer Formations contain about nine or ten species.

LUTRARIA ELLIPTICA, *Lamarck*. Tab. XXIV, fig. 1, *a*, *b*.

MACTRA LUTRARIA.		*Linn.*	Syst. Nat., ed. 12, p. 1126, No. 101, 1767.
—	—	*Brocchi.*	Conch. Foss. Subap., p. 536, 1814.
LUTRARIA ELLIPTICA.		*Lamk.*	Hist. des An. s. Vert., tom. v, p. 468, No. 2, 1818.
—	— ?	*Basterot.*	Foss. de Bord., p. 94, 1825.
—	—	*Phil.*	Enum. Moll. Sic., vol. i, p. 9; vol. ii, p. 7.
—	—	*Desh.*	Exp. Sci. Alger. Moll., pls. 33, 35, 36.
—	—	*Sismonda.*	Syn. Method. An. Inv. Ped. Foss., p. 23, 1847.
—	—	*Forb.* and *Hanl.*	Hist. Brit. Moll., vol. i, p. 270, pl. 12.
—	—	*Nyst.*	Conch. Foss. de Belg., p. 75, 1844.
—	— ?	*Gratel.*	Cat. Zool. de Terr. Tert. de la Gironde, p. 76, 1838.
—	VULGARIS.	*Flem.*	Brit. An., p. 464, 1828.
		Lister.	Hist. Conch. Lib., 111, fig. 259.

Spec. Char. Testâ ovato-oblongâ vel ellipticâ, inæquilaterali, læviusculâ, anticè subangulatâ, utrinque hiante; sinu palliari profundo.

Shell ovately oblong or elliptical, inequilateral, somewhat smooth; anterior side the shorter, and slightly angulated; gaping at both extremities; pallial sinus deep.

Length, 5¼ inches. *Height*, 3 inches, nearly.

Locality. Cor. Crag, Sudbourn and Ramsholt.
Red Crag, Sutton.
Clyde Beds, and Irish and Lancashire Drift Beds. (*Forbes.*)
Recent, Mediterranean, Britain.

This fine, handsome shell is, I believe, not very rare at Sudbourn, though specimens of it are difficult to obtain. My cabinet contains one individual, with the two valves united, which I found at Ramsholt. There is a slight difference in our fossil, varying somewhat in its outline, more especially on the anterior or shorter side. In the recent shell, the dorsal portion is there more convex or rounded; but in the Crag specimen, this part is nearly straight, giving an angular form to that side; this difference, however, does not appear sufficient to affect the specific assignment. Each valve has a

large angular-formed or spoon-shaped depression for the ligament, before which, and immediately beneath the umbo, is a prominent ∧-formed tooth in the right valve, which fits into an angular depression in the left. The comparative dimensions are somewhat variable, like what is observable in the living shell.

The habitat of the living animal is said to be in oozy sand, or muddy bottoms, varying in depth from six to twelve fathoms.

Macha, *Oken.* 1815.

Chama (golar). *Adanson.*
Hypogæa Hypogæoderma (sp.) *Poli,* 1791.
Siliquaria (part). *Schum.* 1817.
Adasius. *Leach,* MS. Fide *Gray.*
Psammosolen. *Bronn.* 1831.
Psammobia (sp.) *Turt.* 1822.
Solecurtus (sp.) *Blainv.* 1824.
Novaculina? *Benson,* 1830.
Cyrtosolen. *Herrm.* 1847.
Macha. *Agass.* 1839. *Gray,* 1851.

Generic Character. Shell transverse, of a somewhat oblong form, compressed in the middle, equivalved, equilateral; rounded and gaping at both extremities; surface generally ornamented more or less with oblique grooves or striæ. Hinge composed of two diverging teeth in one valve, and one in the other, with a large fulcrum for an external ligament. Impression of the mantle deeply sinuated.

Animal oblong, large and thick, mantle widely open in front for the passage of a large tongue-shaped foot. Siphons long, deeply separated, but united at their bases.

This has been justly separated from the *Solens,* on account of the different position of the hinge, though in its habits there is great similarity, and it is capable of burying itself rapidly in the sand.

Fossils, probably belonging to this genus, have been obtained from the middle Secondary Period.

Macha strigillata, *Linnæus.* Tab. XXV, fig. 3, *a, b.*

Solen strigillatus. *Linn.* Syst. Nat., ed. 12, p. 1115, No. 30, 1767.
— — *Chemn.* Conch. Cab., vol. vi, t. 6, figs. 41, 42.
— — ? *Poli.* Test. utriusq. Sic., vol. i, p. 21, t. 12, fig. 1.
— — *Phil.* Enum. Moll. Sic., vol. i, p. 5.
— candidus? *Broc.* Conch. Foss. Subap., p. 497.
Psammobia strigillata. *Turt.* Brit. Biv., p. 97, t. 6, fig. 13, 1822.
Solecurtus strigillatus. *Phil.* Enum. Moll. Sic., vol. ii, p. 5, 1841.
Macha strigillata. *Gray.* List Brit. Moll., p. 61, No. 1, 1851.
Hypogæa variegata. *Poli.* Test. Sicil. utrius., vol. ii, p. 257.

Spec. Char. Testá ovato-oblongá, subæquilaterali, utrinque rotundatá, in mediá compressá, coarctatá; dimidiam striatam, striis subobliquis insculptis.

Shell ovately oblong, rounded at both extremities, slightly inequilateral, compressed in the middle, with a small contraction in the ventral margin; one half covered with oblique striæ.

Length, 2 inches.

Locality. Cor. Crag, Sutton. Recent, Britain? Mediterranean.

My specimens are few and fragmentary. They appear to possess about twenty-two divergingly imbricated ridges, or lines, covering about two thirds of the shell. These lines are vertical in the centre, one or two sloping a little towards the anterior.

There are the remains of colour in my specimens, and they correspond in that respect with what the British conchologists consider to be distinct, and different from the white variety, which is ornamented with the same kind of sculpture. The lines on my fossil do not appear to extend quite so far upon the anterior side as in the recent shells, but there is little doubt of its identity with either this or *M. candida*. Philippi gives both as inhabitants of the Mediterranean, as well as fossil in that part of the world, distinguishing the two species in the fossil state by the number of rays. This, I am afraid, is a questionable distinction; specimens of the red variety may be observed, on which may be counted the same number he has given to each species.

In that extraordinary book, Pontoppidon's 'Nat. Hist. of Norway,' p. 165, there is the figure of a shell called the smaller mussel, which is one of the varieties of this species, but it is not enumerated by Lovén in his 'Ind. Moll. Scand.' The shell from the Older Tertiaries, *Solen strigillatus*, Lamarck, 'Ann. du Mus.' t. 12, pl. 43, fig. 5, is distinct; the one referred to by Basterot (p. 96), from the neighbourhood of Bordeaux, I have not seen.

Solen,* *Arist., Linn., &c.*

Solena. *Browne*, 1756.
Hypogæa and Hypogeoderma (sp.) *Poli*, 1791.
Solenarius? *Dumeril*, 1806.
Vagina. *Megerle*, 1811.
Ensis. *Schum*, 1817. *J. Sow.* 1846. *Gray*, 1851.
Ensatella. *Swains.* 1840.

Generic Character. Shell equivalved, transverse, linear, subcylindrical, straight or very slightly curved, gaping widely at both extremities, dorsal and ventral margins nearly parallel, umbones near the extremity. Hinge with two teeth in one valve, and one in the other, with sometimes a linear lateral tooth. Muscular impressions dissimilar. Palleal sinus short and wide. Ligament external, attached to an elongated fulcrum. In the recent state, covered with a thick epidermis.

* Etym. σωλην, a tube.

Animal narrow, and more or less cylindrical, with the mantle united at the borders, except in front, where it is open for the passage of a large and truncated foot. Siphons short and united, their margins fimbriated.

The generic character is here intended for the reception of those species known under the familiar appellation of Razor Shells, of a form resembling the handle of our common razors. A few modern authors still consider that the differences possessed by some of the shells of this peculiar form entitle them to a further division, and have united, under the name of *Ensis*, proposed by Schumacher, the species which possess a lateral tooth or lamina, and reserving to *Solen* those only in which this linear or transverse appendage is wanting.

The hinge of this genus is more anterior than that of any of the Bivalves, being situated at the extremity of the shell. Probably a more than usual strength of union for the two valves was required at this part to resist the action of its large and powerful foot, in consequence of the burrowing habits of the animal.*

This appears a modern genus, no true species having as yet been described as belonging to any Formation more ancient than the Lower Tertiaries, where some of the species deviate slightly from the type, the hinge not being quite at the extremity. The few shells somewhat of this form, found in the Palæozoic Rocks, are very doubtful *Solens*.

1. SOLEN GLADIOLUS, *Gray*. Tab, XXV, fig. 8, *a—c*.

SOLEN GLADIOLUS. *Gray*. Zool. of Beechey's Voy., p. 153, t. 43, figs. 4, 4, 1839.
— ENSIS var. MAJOR. *Nyst*. Coq. Foss. de Belg., p. 44, pl. 1, fig. 3, *a*, *b*, 1844.
ENSIS COMPLANATUS. *J. Sowerby*. Min. Conch., t. 642, figs. 2, 4.

Spec. Char. Testâ elongatâ, rectâ, lævigatâ; extremitate anticâ obtusè truncatâ; in valvâ sinistrâ unidentato, in alterâ bidentato; dentibus lateralibus elongatis, marginatis.

Shell lineal or subcylindrical, straight and smooth, anterior extremity obtusely truncated; one cardinal tooth in the left valve, and two in the other; lateral teeth marginal.

Length, 5 inches. *Height*, 1 inch.

Locality. Red Crag, Walton Naze and Suffolk.

Recent, Arctic Seas.

* Some confusion has existed respecting the anterior and posterior sides of these shells. Poli has given a good and correct representation of one of the species of this genus, with its foot protruded at the anterior, and the siphons at the opposite extremity. In the 'Ency. Method.,' vol. iii, pl. 312, fig. 4, the *Solen* is depicted with the siphons at the anterior side; and in pl. I of the 'Hist. of Brit. Moll.,' all the animals are there represented as having the *foot* on the posterior or ligamental side of the shell. This is evidently the result of haste, or of the too numerous avocations of the late much lamented and talented author of the Malacological portion of that beautiful work, preventing the bestowal of a necessary attention for the avoidance of these trifling errors.

Fragments of this species are by no means rare, and pervade the whole of the Red Crag Deposit. The specimen figured is one of a pair of valves found in situ at Walton Naze, but in a very fragile condition, and much reduced in substance. The fragments from Suffolk display, generally, a greater solidity in the anterior portion, which is that most commonly obtained.

Much importance has been placed upon differences in proportional dimensions. In this, the length is about five times that of its height, while in *S. siliqua* some specimens are as one to eight. The greatest difference appears to be in the impression of the margins of the mantle; in this it is more inward, or further from the anterior edge, and, on the contrary, the more linear shell (*S. siliqua*) has the impression nearer the extremity, with a slight difference also in the form of the anterior adductor. The truncation of this extremity generally forms an angle of about 95°, but this is not constant; and I am inclined to believe (although they are here separated in deference to the recent conchologists, who have better materials to work upon) that the two forms are merely varieties of one and the same species, the differences of locality and other conditions producing all the variations shown by the two shells.*

2. Solen siliqua, *Linnæus.* Tab. XXV, fig. 7, *a—e.*

Solen siliqua. *Linn.* Syst. Nat., ed. 12, 1113, No. 34, 1767.
— — *Poli.* Test. Sicil., vol. i, pl. 10, figs. 7—11.
— — *Turt.* Brit. Biv., p. 80, pl. 6, fig. 5, 1822.
— — *Phil.* En. Moll. Sic., vol. i, p. 4; vol. ii, p. 5.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 246, pl. 14, fig. 3.
— novacula. *Mont.* Test. Brit., p. 47, 1803.
— ligula. *Turt.* Brit. Biv., p. 82, pl. 6, fig. 6.
— major. *List.* Hist. Conch., lib. iii, fig. 255.

Spec. Char. Testâ lineari, rectâ, lævigatâ; extremitate subtruncatâ non marginatâ; in valvâ sinistrâ unidentato, in alterâ bidentato; dentibus lateralibus elongatis.

Shell linear or cylindrical, straight and smooth; extremity truncated, not marginated; one cardinal tooth in the left valve, and two in the other; lateral teeth elongate.

Length, 5 inches. *Height,* $\frac{3}{4}$ inch.

* It is possible that a portion of the Red Crag of Suffolk may have been derived from the destruction of the Older or Coralline Crag Formation, intermixed with the exuviæ of animals belonging to the seas of the former period, as well as with other extraneous fossils. The cliff at Walton Naze, however, affords strong presumptive evidence that the whole of the Red Crag is not derivative, and that the animals whose remains are there deposited, lived and died in the spot where they are now found. Bivalves are frequently obtained in this locality with the two portions united, and it seems scarcely possible that such a specimen as the above could have been removed out of one Formation to have been deposited, with its two fragile valves in their natural position, in the mud or sand of a succeeding period.

Locality. Red Crag, Sutton.
Clyde Beds, and Irish Drift.
Recent, Mediterranean, Britain.

This shell, I believe, has not been met with in the Coralline Crag: in the Red Crag it is not by any means abundant, and always in a fragmentary state. In my best-preserved specimen, the anterior termination is rather more rounded than that of the recent species to which it is assigned, but I have not enough to say if such be a constant character.*

3. SOLEN ENSIS, *Linnæus.* Tab. XXV, fig. 6, *a—f.*

SOLEN ENSIS.	*Linn.*	Syst. Nat., ed. 12, p. 1114, No. 35, 1767.
— —	*Poli.*	Test. Sicil., vol. i, p. 18, t. 11, fig. 14, 1791.
— —	*Broc.*	Conch. Foss. Subap., p. 479, 1814.
— —	*Gould.*	Invert. Massach., p. 29, 1841.
— —	*Desh.*	Exp. Scient. Alger., p. 184, pl. 11, figs. 1—4.
— —	*Nyst.*	Coq. Foss. Belg., p. 44, pl. 1, fig. 4, *a, b,* 1844.
— —	*Lovén.*	Ind. Moll. Scand., p. 49, 1846.
— — ?	*Grateloup.*	Cat. Zool. Invert. Gironde, p. 68, No. 819, 1838.
— —	*Sismonda.*	Syn. Ped. Foss. Invert., p. 23, 1847.
— —	*Forb.* and *Hanl.*	Hist. Brit. Moll., vol. i, p. 250, pl. 14, fig. 2, 1848.
— CURVUS.	*List.*	Hist. Conch., t. 311, fig. 257.
— ENSIFORMIS.	*S. Wood.*	Catalogue, 1840.
— —	*J. Sowerby.*	Min. Conch., t. 642, fig. 1.
— — ?	*Conrad.*	Foss. Med. Tert., p. 76, pl. 43, fig. 8, 1845.
— HAUSMANNI ?	*Goldf.*	Pet. Germ., vol. ii, p. 277, pl. 159, fig. 6, *a—c,* 1842.

Spec. Char. Testâ lineari, arcuatâ, extremitate anticâ curvatâ, non marginatâ; in valvâ sinistrâ unidentato, in alterâ bidentato.

Shell linear, curved, anterior extremity rounded, not marginated; one cardinal tooth in the left valve, and two in the right.

Length, 3 inches. *Height,* ½ inch.

Locality. Cor. Crag, Sutton, Ramsholt, Sudbourn.
Red Crag, Sutton, Walton Naze.
Irish Drift (*Forbes*).

Recent, N. E. Coast of America, Brit. Seas, Mediterranean, Sea of Okhotsk (*Middendorf*).

This species first appears in the Coralline Crag, where it is not very abundant;

* Since the above was written, I have obtained an imperfect specimen (fig. 7, *a, b*) of what appears to belong to this species, judging from its linear character, in which the muscular impressions are, like those of *S. gladiolus,* at a greater distance from the anterior margin, and which I first imagined to be a tangible distinction. I now believe the two may be specifically united.

but at Walton Naze, in the Red Crag, small specimens and fragments may be plentifully obtained.

The same proportional and other differences exist between this and the recent British shell as between *S. siliqua* and *S. gladiolus*, and on that account I imagined it to be specifically distinct when my 'Catalogue' was drawn up, and proposed for it the name of *S. ensiformis*, from its near relationship; but I now believe the Crag shell to be entitled to no more, if scarcely so much, as a distinct variety, the form and position of the muscular impression varying according to the greater elongation of the shell being nearer the extremity in the more lengthened or attenuated varieties, this elongation probably being dependent upon some peculiarity of habit or locality.

In some specimens given to me as *Solen Americanus*, the proportional length is even greater than in the recent British shell, and with a rounded termination; and none of the specimens that I have seen from America appear entitled to a specific appellation different from that of *ensis*.

S. marginatus has, in the living state, a wide geographical range, being found on the coast of Finmark (*Lovén*), and according to Von Hemprich is an inhabitant of the Red Sea; but I have never met with a fragment in any of the Crag Formations that could be justly assigned to that species.

S. (*Ceratisolen*) *legumen* is given by Mr. Smith in his 'List of Shells from the Clyde Beds.'

Cultellus,* *Schumacker*, 1817.

Cultellus. *Desmoul.* 1832.
Solen (sp.) *Spengler, Linn., Chemn.*

Generic Character. "*Testâ æquivalvis, transversim oblongâ, subcomplanatâ utrinque hians. Cardo in valvâ dextrâ; dentes duo cardinales subcompressi alter erectus, alter decumbens. In valvâ sinistrâ cardinales tres medius sub-bifidus, apicibus divaricatis anterior decumbens. In utraque valvâ callus marginalis.*"—Schum.

Type. Solen cultellus. Animal ?

There is, I think, full justification for considering this as entitled to generic isolation; the very peculiar form of the hinge furniture, as well as the position of the ligament (being removed to some distance from the extremity), are characters very different from those of *Solen*.

There are at present but few species known, either in a recent or fossil state, possessing the above characters. Two or three shells, with this peculiar form of hinge, have been obtained from the Older Tertiaries, but I am not acquainted with any of an anterior date.

* Etym. *Cultellus*, a little knife.

CULTELLUS TENUIS, *Philippi*. Tab. XXV, fig. 2, *a—d*.

SOLEN TENUIS. *Phil.* En. Moll. Sic., vol. i, p. 6, pl. 1, fig. 2, 1836.
— — *Id.* En. Moll. Sic., vol. ii, p. 5, 1844.
— GENUIS. *Nyst* et *West*. Nov. Rech. Coq. Foss. d'Anv., p. 3, No. 4, 1839. Misprint.?
— TENUIS. *Nyst*. Coq. Foss. de Belg., p. 46, pl. 1, fig. 5, 1844.
CULTELLUS CULTELLATUS. *S. Wood*. Catalogue, 1840.
— — *J. Sowerby*. Min. Conch., t. 642, figs. 5—8.

Spec. Char. "*Testâ oblongo-lineari, rectâ, utrinque rotundatâ, tenuissimâ; cardinibus lateri antico approximatis, in valvulâ dextrâ bidentatis, in sinistrâ tridentatis.*"—Philippi.

Shell linearly oblong, straight, rounded at both extremities, very thin; very inequilateral; two cardinal teeth in the right valve, and three in the left.

Length, $1\frac{1}{4}$ inch.

Locality. Cor. Crag, Sutton.
Red Crag, Walton Naze.

This shell is rare in my cabinet. Two specimens of the right valve, and one of the left, from Walton-on-the-Naze, are all that I have seen.

The Coralline Crag at Sutton has furnished numerous fragments sufficient to justify the belief in their identity with the Belgian fossil and the Mediterranean species, but it is not *S. pellucidus*, Penn. M. Philippi's figure shows a much greater inequilaterality than our fossil, one side being four times the length of the other (probably an error of the artist). In the Crag shell the proportions are as two and a half to one.

It is somewhat broader or higher on the siphonal side, and equally rounded at both extremities. The right valve is furnished with two cardinal teeth, the anterior one is vertical and compressed, the other larger and diverging. In the left valve are three teeth, the centre one is large, and deeply cleft or bifid, one portion decumbent, almost parallel with the ligamental fulcrum. The muscular marks in my specimens are indistinct.

The shell to which this appears to bear the nearest relationship (judging alone from the drawing of the exterior), is one obtained in the Corea, figured by Messrs. Reeves and Adams (*Solen albida*), 'Voy. of the Samarang, 1850,' p. 84, pl. 23, fig. 15.

THRACIA, *Leach*, MS. 1819.

MYA (sp.) *Montague*, 1803.
LIGULA (sp.) *Id.* 1808.
AMPHIDESMA (sp.) *Lamk.* 1818.
ANATINA (sp.) *Id.* 1818.
IXARTIA. *Leach*, MS. 1819.
THRACIA. *Blainv.* 1825. *Rang.* 1829.
OSTEODESMA (sp.) *Blainv.* 1825.
ODONCINETUS. *Da Costa*, 1829.
CORIMYA (sp.) *Agass.* 1842.
ODONTOCINETA. *Id.*
CINETODONTA. *Herrm.* 1847.

Generic Character. Shell transversely ovate, inequivalve, often nearly equilateral; tumid or compressed, generally thin, slightly gaping; surface smooth or minutely granulated. Hinge with an internal cartilage attached to a projecting callosity. Often a small cleft in the umbo, formed by the ligament. Impressions by the adductors unequal; mantle-mark deeply sinuated.

"Animal ovate; mantle closed, except for the passage of a compressed linguiform foot; siphons rather long, separated to their bases, and furnished with fimbriated orifices, which are often inflated into a globular form."—*Clark.*

M. Deshayes having discovered a detached ossiculum in the hinge of one or more species possessing somewhat similar external characters, presumed it to exist in all, and proposed, in consequence, a family (*Osteodesmidæ*) founded upon this character, distinguishing the genera by the peculiar form of this "little bone," and its position in the hinge, it being held between the cardinal callosities by a portion of the internal ligament, sometimes close to the anterior, at others on the opposite part of the cartilaginous area.

The distinctions founded upon such characters are but doubtfully sufficient for generic separation, even where its position could be correctly determined. There is, however, a peculiarity in the calcareous callus of the hinge, or support for the ligament, in this genus, sufficient to prevent its being confounded with any other.

The shells are generally thin, with a rugose or scabrous exterior. They are probably of great antiquity, as fossils of this form are found in the lower Oolites, and doubtfully so in the Carboniferous series.

In the living state, the species frequent sandy or sandy-mud shores, and have a range from low-water mark to very considerable depth. Dead shells have been found as deep as 110 fathoms.

1. THRACIA PUBESCENS, *Pulteney.* Tab. XXVI, fig. 1, *a*—*d.*

MYA PUBESCENS. *Pult.* In Hutchins' Dorset., p. 27.
— — *Turt.* Conch. Dict., p. 99, fig. 35, 1816.
— DECLIVIS. *Donov.* Brit. Shells, vol. iii, pl. 82, 1801.
ANATINA MYALIS. *Desh.* 2d ed. Lamk., vi, p. 80, 1835.
— — *Crouch.* Int. to Lamk. Conch., p. 7, pl. 4, fig. 1, *a*, *b*, 1827.
— PUBESCENS. *Turt.* Brit. Biv., p. 45, 1822.
AMPHIDESMA PUBESCENS. *Flem.* Brit. An., p. 431, 1828.
THRACIA PUBESCENS. *Kiener.* Coq. viv. Thracia, p. 5, pl. 2, fig. 2.
— — *Desh.* Exp. Moree. Zool., p. 87, pl. 18, fig. 1.
— — *Couth.* Bost. Journ. Nat. Hist., vol. ii, p. 135, 1839.
— — *J. Sow.* Min. Conch., t. 631, fig. 1, 1844.
— — *Forbes.* Ægean Invert., p. 182.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., p. 226, pl. 16, figs. 2, 3.
— MONTAGUI. *Leach,* MSS., 1818. Ann. and Mag. Nat. Hist., vol. xx, p. 272, 1847.
LLGULA PUBESCENS. *Mont.* Test. Brit. Supp., p. 23, 1808.

Spec. Char. Testâ ovato-oblongâ, transversâ, convexiusculâ, tenui, subæquilaterali, anticè rotundatâ, posticè truncatâ, et angulatâ; punctis minutissimis asperatâ; callo ligamentifero magno.

Shell ovately oblong, transverse, slightly convex, thin, subequilateral, anterior side rounded, posterior truncated and angulated, exterior minutely granulated; hinge with large projecting callus, divided by a ridge.

Length, 2½ inches. *Height*, 2½ inches.

Locality. Cor. Crag, Sutton and Gedgrave.

Clyde Beds. *Smith.* Recent, Britain and Ægean.

A thin and fragile shell, not very rare, but difficult to obtain. Like most of the specimens of this genus found in the Crag, they are somewhat distorted from compression, and one or other of the valves in consequence cracked, thereby altering a little the natural appearance of the shell. On closely comparing it with the existing species, it may be remarked that the left valve is rather less contracted,—that is, the ventral margin is more convex, or not so straight, as in the living shell, and the umbo apparently less prominent; but the few specimens that I have seen are all pushed a little out of their natural position, and these trifling differences would probably disappear in a larger and better series.

2. THRACIA PHASEOLINA, *Lamarck.* Tab. XXVI, fig. 2, *a—c.*

MYA DECLIVIS. *Turt.* Conch. Dict., p. 98, 1816.
ANATINA DECLIVIS. *Id.* Brit. Biv., p. 47, 1822.
— PUBESCENS. *Id.* Brit. Biv., p. 45, t. 4, fig. 3 (young).
AMPHIDESMA PHASEOLINA. *Lamk.* Hist. Nat., tom. v, p. 492, No. 11, 1818.
THRACIA PHASEOLINA. *Keiner.* Coq. viv. Thracia, pl. 2, fig. 4.
— — *Phil.* En. Moll. Sic., vol. i, p. 19, t. 1, fig. 7, 1837.
ODONCINETA PAPYRACEA. *Da Costa.* Test. Sicil., p. 23, pl. 2, figs. 1—4, 1829.
THRACIA PHASEOLINA. *Forb.* and *Hanl.* Hist. of Brit. Moll., p. 221, pl. 17, figs. 5, 6; and pl. H (animal), fig. 4, 1848.
— — *Couth.* Bost. Journ. Nat. Hist., p. 147, 1839.
— — *Lovén.* Ind. Moll. Scand., p. 46, No. 321, 1846.
TELLINA PAPYRACEA. *Poli.* Test. Sicil., t. 15, fig. 18.

Spec. Char. Testâ elongato-ovatâ, transversâ, subæquilaterali, tumidiusculâ, tenui; anticè rotundatâ, posticè truncatâ; margine ventrali convexiusculo.

Shell elongato-ovate, transverse, nearly equilateral, thin, and fragile; anterior side rounded, posterior truncated; ventral margin slightly rounded.

Length, 1 inch. *Height*, ⅝ inch.

Locality. Cor. Crag, Sutton.

Recent, Britain, Mediterranean, Scandinavia.

Small specimens are by no means rare at Sutton; and as the recent conchologists profess to have sufficient evidence for the separation of this from the young of *T.*

pubescens, I have followed their example, although the characters for specific separation are not clearly defined,—the distinction appearing to rest solely upon one being more transverse than the other. There is, I think, little doubt but the so-called two species lived in the sea that deposited the Coralline Crag.

Two or three fragments of what may be this species, or the young of the preceding, are in my cabinet, from the Red Crag of Sutton; and a specimen belonging to this transverse form is in the cabinet of Mr. Morris, from Uddevalla.

Thracia detruncata, of my 'Catalogue' (fig. 1, *e*), is probably only a distorted specimen of a young individual of either this or of the preceding species.

The umbo is cleft by the ligament, which must have been visible when the valves were closed.

3. THRACIA INFLATA, *J. Sowerby*. Tab. XXVI, fig. 6, *a*—*e*.

THRACIA CONVEXA. ? *S. Wood*. Catalogue, 1840.
— INFLATA. *J. Sow*. Min. Conch., t. 631, figs. 2—4, 1845.
— CONRADI. ? *Couth*. Bost. Journ. Nat. Hist., vol. ii, p. 153, pl. 4, fig. 2, 1839.

Spec. Char. Testâ obovatâ, convexa, inflatâ, sublævigatâ, tenui, fragili; anticè rotundatâ, posticè subtruncatâ et angulatâ; margine ventrali arcuato.

Shell obovate, convex, tumid, nearly smooth, thin and fragile; anterior side rounded, posterior angulated and pointed; ventral margin curved.

Length, $3\frac{1}{2}$ inches. *Height*, $2\frac{3}{4}$ inches.

Locality. Cor. Crag, Sudbourn.

This species appears to be restricted to the neighbourhood of Orford, where it is not at all scarce, though the specimens are rarely in perfect condition: they are generally more or less compressed, and the inflated character destroyed. Amongst my specimens a considerable variation may be observed, some being much more elongated than others.

The right is the thinner and more inflated valve, and the one that is generally fractured and compressed. Impressions by the adductors are unequal in size, and the sinus in the mantle-mark is rounded and rather deep. A small sinus is visible at the umbones, through which the ligament must have protruded; but that part of the shell being particularly thin, it is there generally destroyed or injured. The hinge is an elongated callosity, on which was placed the cartilage, with a linear depression or furrow on the outside of it for the ligamental portion, differing from that of *T. pubescens*, in which this callus is of a triangular form and projects inwardly. The exterior is smooth, with the exception of lines of growth and some rugosities, particularly upon the siphonal side; but it has not the shagreen-like sculpture which ornaments the entire surface of *T. pubescens*.

From the want of a good series of very perfect specimens, it is difficult to say whether this be really distinct. *T. corbuloides* appears to have the anterior side the smaller; and although *T. Conradi* comes very near to our Crag fossil, it differs also in the same character, and has a rather more prominent umbo. A difference also is shown in the sinus, which is not only deeper, as it would naturally be from the difference in the proportion of the sides, but it appears somewhat more angular in the recent American shell. I am, however, inclined to believe, that when a better comparison can be instituted, it may be found not to differ specifically from *T. Conradi*.

4. THRACIA VENTRICOSA, *Philippi*. Tab. XXVI, fig. 5, *a—c*.

THRACIA PUBESCENS. *Phil.* En. Moll. Sic., vol. i, p. 19, t. 1, fig. 10, 1836.
— VENTRICOSA. *Id.* En. Moll. Sic., vol. ii, p. 17, 1844.

Spec. Char. Testâ ovato-oblongâ, tumidâ, subæquilaterali, inæquivalvi, tenui; anticè angustatâ, posticè truncatâ, et angulatâ; valvâ dextrâ tumidiore; umbonibus magnis recurvatis; margine ventrali conveæiusculo.

Shell ovately oblong, inequilateral, tumid, inequivalved, thin; anterior side slightly produced, posterior truncate and angulated; right valve the more tumid; beaks large; ventral margin slightly curved.

Length, $1\frac{3}{4}$ inch. *Height*, $1\frac{1}{8}$ inch.

Locality. Cor. Crag, Ramsholt, Gedgrave.
Fossil, Sicily.

Two or three specimens only have come into my possession. They are assigned to the Sicilian species with a slight degree of doubt, differing somewhat from a Sicilian fossil in my cabinet, which I presume to be the *T. ventricosa*. It is rare to find the fossils belonging to this genus in a perfect condition, their extreme thinness being insufficient to preserve them in their natural form, and their characters in consequence are difficult to determine.

Our fossil is finely granulated all over, more particularly so on the siphonal side, differing from the preceding (*T. inflata*), the shells of which are nearly smooth. Philippi represents his shell as equivalved; but in my Sicilian fossil there is an evident inequality in the valves, and the proportions of the two sides do not exactly correspond.

There is a linear depression for the ligamental portion of the hinge, and the support for the cartilage is very narrow, giving it almost the appearance of having an entirely external ligament.

T. convexa is said by Messrs. Forbes and Hanley to be found fossil in the Newer Tertiaries or Pleistocene Clays of Belfast, as also in the Clyde Beds.

Cochlodesma,* *Couthouy*, 1839.

Spoonhinge. *Petiver*, 1764.
Laternula. *Bolten*, 1798.
Mya (sp.) *Mont.* 1803.
Ligula (sp.) *Id.* 1808.
Auriscalpium. *Muhlf.* 1811.
Anatina (sp.) *Lamk.* 1809. *Woodw.* 1854.
Bontæa. *Leach*, MS. 1819. *Gray*, 1851.
Galaxura. *Id.* 1819.
Periploma. ? *Schum.* 1817.
Amphidesma (sp.) *Flem.* 1828.
Thracia (sp.) *Lovén.* 1846.

Generic Character. Shell thin, transversely ovate, slightly inequivalved, inequilateral, gaping, rather compressed, right valve the more convex. Hinge with a spoon-shaped process in each valve, for the reception of the cartilage, with a minute fissure in the umbo, through which the ligament slightly projects. Surface smooth, or finely granulated, especially on the siphonal side; covered in the recent state with a fine epidermis. Adductor muscles slightly impressed, with a sinus in theimpression of the mantle.

Animal with its mantle closed, except in front, for the emission of a broad compressed foot; siphons long and slender, divided in their whole extent.

This genus closely resembles that of *Thracia*, in the animal as well as in the shell, differing in the latter, however, by having the support for the cartilage of a more spatulate or spoon-shaped form, which is less intimately united along the dorsal edge, and in the absence from the hinge of the ossiculum.

The name *Anatina* was proposed as a genus by Lamarck in 1809, taking for his type *Solen anatinus*, Linn., a shell in some respects similar to those here included, by having a spoon-shaped process projecting inwardly, upon which was placed its internal ligament. It has, however, a very wide gape, and the animal has long and *united* siphons, clothed with a wrinkled epidermis; while the animal of *Cochlodesma* has its siphons long, slender, and *divided* throughout. The animals, therefore, being so dissimilar, they are scarcely entitled to the same name, nor could they be included in the above generic diagnosis.

I have never seen a shell with this form of hinge from any Formation of an age anterior to that of the Coralline Crag.

1. Cochlodesma complanatum, *S. Wood.* Tab. XXVI, fig. 3, *a*, *b*.

Spec. Char. Testâ compressâ, elongato-subovatâ, lævi, inæquilaterali, tenui; anticè majore, rotundatâ; posticè subtruncatâ; valvâ sinistrâ depressâ; sinu palliari mediocre.

Shell compressed, elongately ovate, smooth and very thin, inequilateral; anterior

* Etym. κοχλος, shell, and δεσμα, ligament.

side the larger, and rounded; left valve much depressed; palleal sinus of moderate size, rather broad.

Length, $\frac{7}{8}$ inch. *Height*, $\frac{2}{16}$ inch.

Locality. Red Crag, Walton Naze.

About half a dozen perfect specimens are in my cabinet: unfortunately they are all the left valve.

In comparing my fossils with a specimen of *Cochlodesma Leanum*, Couthouy, 'Bost. Journ. Nat. Hist.,' vol. ii, p. 170, (a recent species from America, and its nearest relative,) the Crag shell appears to be less equilateral, the siphonal side being much the shorter of the two, and I have in consequence considered it distinct. Our shell may be further described as rather flatter compressed, the left valve being the more so of the two, judging from a fragment of the right one in my cabinet; the umbones are slightly prominent, and cleft by the ligament; the spoon-shaped process is broad and strong, projecting towards the anterior; the exterior shows merely lines of growth, with a slight rugosity on one side, but it is not covered with the granulated or shagreen surface of *C. prætenue;* the palleal sinus extends inwardly, a little beyond a line drawn perpendicularly from the umbo.

2. COCHLODESMA PRÆTENERUM, *S. Wood.* Tab. XXVI, fig. 4, *a*, *b*.

ANATINA PRÆTENERA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ transversâ, ovatâ, inæquilaterali, inæquivalvi, tenui, fragili; anticè rotundatâ convexiusculâ; posticè breviore, truncatâ, subrostratâ; tenuissimè granulatâ.

Shell transversely ovate, inequilateral, inequivalved, thin and fragile, with a finely granulated exterior; anterior side the larger, rounded, and slightly tumid; ventral margin curved.

Length, $\frac{3}{4}$ inch. *Height*, $\frac{1}{2}$ inch.

Locality. Cor. Crag, Sutton.

I have about half a dozen specimens of this shell. It differs from *C. prætenue* in having the siphonal side shorter, narrower, and truncated, with a more distinct angular slope from the umbo to the ventral margin; the anterior dorsal edge is very thin, and slightly folded over, with a small sinus at the extreme point of the umbo, through which the ligament was visible, and probably projected somewhat; the exterior is smooth to the naked eye, but under a magnifier appears finely granulated. The impressions by the adductor muscles indistinct; the palleal sinus extends a little beyond the cartilage support.

A small specimen in my cabinet, from the same locality, strongly resembles, and is probably the young state of *C. prætenue*, but the hinge is injured. I have some fragments also of what may perhaps be another species, with a very scabrous

surface, which passed in my 'Catalogue' under the name of *A. asperima;* they are too imperfect for further notice. The siphonal side appears too short to belong to *C. prætenue,* and too rugose for the present species.

Pholadomya, *G. Sowerby,* 1823.

Cardium (sp.) *Mantell. J. Sowerby.*
Lutraria (sp) *J. Sowerby.*
Cardita (sp.) *J. Sowerby.*

Generic Character. Shell very thin, transparent or hyaline, of a nacreous texture, transverse, ovate or cordiform, ventricose, equivalved, inequilateral; anterior side short, posterior produced and gaping. Hinge with a small obtuse tooth. Ligament external. Mantle-mark deeply sinuated.

Animal of the form of the shell, with the edges of the mantle united, except where open for the emission of the foot, which is bifurcated. Siphonal tubes large.

Only one species of this genus is known in the living state, and that is an inhabitant of the tropics and was found at St. Lucia.* The animal of this has been examined by Professor Owen, whose observations thereon were made known at the Zoological Society in 1842.

Its position, as indicated by the animal, is considered by that anatomist to be near to *Panopæa.* Dr. Gray, in his arrangement, has placed it between *Cardita* and *Astarte.*

It is, no doubt, very nearly related to a group of shells largely developed in the Secondary Formations, for which M. Agassiz proposed to establish a family under the name *Myadæ,* 'Etudes Critiques sur les Mollusques fossiles.' These he separated into several genera, the divisions depending sometimes upon the hinge furniture, but in most instances upon the outward form of the shell, a dependence by no means safe.† These fossils are generally found in a state of casts only, though some few of them have been obtained exhibiting portions of the shell attached, showing them to have possessed a thin, oftentimes a papyraceous and transparent shell, of a nacreous texture, and they were in most instances covered with a papillaceous or scabrous exterior. They bear a considerable inter-resemblance in their general character, and are no doubt intimately connected zoologically; but they are of very doubtful relationship to *Mya,* the reputed father of the family, whose age we are unable to date beyond the Tertiaries.

* *Ph. crispa* and *Ph. caspica,* given by Agassiz in his 'Monog. of the Myadæ' as existing species, belong to, or at least are nearly related to, the genus *Cardium,* and differ only in having elongated siphons, and a sinuated mantle-mark (*Adacna,* Eichwald). *Lyonsia navicula,* Reeves, 'Voy. of the Samarang,' p. 38, pl. 23, fig. 11, may perhaps be an aberrant form of this genus.

† This family has been ably analysed by Professor Morris in his recent 'Descriptions of the Fossils of the Great Oolite.'

Pholadomya is a genus of great geological antiquity, being known as early as the Coal Measures, and continued to the present time through the Secondary Periods, where it was largely developed, presenting only a few species in the Tertiaries.

PHOLADOMYA HESTERNA, *J. Sowerby*. Tab. XXX, fig. 1, *a—d*.

PHOLADOMYA CANDIDOIDES. *S. Wood*. Catalogue, 1840.
— HESTERNA. *J. Sow*. Min. Conch., t. 629, 1844.

Spec. Char. Testâ transversâ, ovato-oblongâ, aut irregulariter pyriformi, valdè inæquilaterali; anticè ventricosâ, rotundatâ vel subtruncatâ; posticè productâ; mediânâ parte costatâ, costis 10—12.

Shell transverse, ovately oblong or of an irregular pear-shape, very inequilateral; anterior side ventricose, rounded, or slightly truncated; posterior much produced; centre covered with about 10 or 12 ribs.

Length, 4 inches. *Height*, $2\frac{1}{2}$ inches.

Locality. Cor. Crag, Ramsholt and Sudbourn.

This species, as might be expected, is found only in beds which have undergone no disturbance; and at Ramsholt, where these shells are quietly deposited in the sand, I have seen many specimens, but they are exceedingly difficult to obtain, and then with only a small portion of its thin shell remaining. Like those from some parts of the London Clay, the specimens are in general much distorted. Our figure is from one that has preserved its natural form; and although there is a considerable resemblance to the only living species that has as yet been discovered, it seems to be specifically distinct. The recent shell, *Ph. candida*, is more tumid centrally, and less rounded on the anterior side, while on the other it is not so broad, and there is a greater curve in the ventral margin. Our shell appears to have been closed on the anterior side, but had a gape or opening for its probably lengthened siphonal tubes. The hinge is furnished with a small obtuse tooth in each valve, and a marginal lamina or fulcrum for the ligament, this is bipartite, separating slightly the cartilage from the ligament; the umbones, like those of the recent shell, approximate so closely as to have been fractured by the opening of the valves. The ribs of our shell extend over rather more than half the surface, from the obtuse ridge on the anterior side to within about the same distance from the other extremity, and they are covered with small obtuse tubercles; while the small portions of the shell that are remaining present a finely granulated surface, or shagreen, like those of *Anatina*. This is especially visible near the siphonal extremity, but was probably more or less granular all over. *Ph. arcuata*, Agass., 'Etud. crit.,' p. 63, t. 2, *b*, figs. 1—8, resembles our shell, judging from the figure, but appears to have had too many ribs. *Ph. Esmarkei* (Pusch), Goldf., 'Petr. Germ.,' vol. ii, p. 272, t. 157, fig. 10, *a—d*, may probably be the same. I have been unable to examine specimens of either, and have therefore retained Mr. Sowerby's name.

Poromya, *Forbes*, 1843.

Corbula (sp.) *Nyst* and *West.*, 1839.
Embla. *Lovén*, 1846.

Generic Character. "Shell ovate or suborbicular, equivalve, inequilateral, slightly produced posteriorly; surface invested with a scabrous epidermis, beneath which it is pearly and minutely punctated; hinge of a minute cardinal ossicle or erect tooth in one valve, lodged in a pit, or rather depression in the other; no lateral teeth; ligament *external;* palleal impression very slightly sinuated.

"Animal with its mantle open in front; foot long, narrow, and slender; siphons short, unequal, with 18 or 20 tentacles surrounding their bases."—*Forb.* and *Hanl.*

"*Testâ æquivalvis, posticè hians, truncatâ; ligamentum* internum *foveæ utriusque valvæ insertum, ante quam in v. d. dens cardinalis, in v. s. fossâ cardinalis; in v. s. dens lateralis anticus et posticus; in v. d. fossa lateralis, dentes laterales nulli. Impressio palliaris lata, duplicata, posticè leviter sinuosa.*

"*Animal pallio ventre aperto, posticè longe cirrigero, siphonibus instructum.*"—Lovén. Genus, *Embla.*

Mr. Woodward, in his 'Rudimentary Treatise of Recent and Fossil Shells,' has concluded the *Poromya* of Forbes to be a species only of the genus *Thetis.*

The establishment of a genus by the above-named eminent and able modern authors upon an existing shell, the one describing it as possessing an *external* ligament, while the other considers it to have an *internal* one, leaves it, as it were, a sort of open question, or placing it rather in a doubtful position. The type of the genus *Thetis* has an *external* ligament, whereas in the recent British shell and Crag fossil the hinge furniture is more complex; and although a portion of the ligament might have been seen externally when the valves were closed, the larger or cartilaginous part was situated within the edge of the shell, and its action like that of an internal ligament, opening the valves by expansion on the removal of pressure; no portion of which internal ligament appears to be present in those fossils constituting the genus *Thetis;* and as I am imposing no new name for the Crag shell, the correct position must be determined by better materials than I possess; though, judging from my own specimens, I am inclined to believe with Professor Lovén, that the action of its ligament was that of an internal one; and although the greensand fossils are no doubt closely related, the difference in position or action of the ligament is sufficient to justify the separation.*

* The boundary line of generic isolation is indeed exceedingly difficult to define. We all of us give what we conceive to be a limit, but the want of accordance in this respect shows at least that we are as yet very far from having discovered it. The different positions of the ligament in Bivalves, whether acting internally by compression and dilatation, or externally by contraction and elongation over a fulcrum, are distinctions as good as nine out of ten of the characters that are generally employed for these conventional divisions.

The recent species *Neæra hyalina*, Hinds, appears to be more nearly connected with *Thetis*, having an external ligament on a thin and semi-transparent shell, differing thereby from our fossil, which is a thick one. The two shells figured by Messrs. Reeves and Adams in the 'Zoology of the Voyage of the Samarang,' may perhaps belong to *Thetis*, but the position of the ligament is not stated, and the shells are described as being quite smooth and thin.

The Cretaceous fossils of India and Westphalia, assigned to this genus, have not as yet had their characters sufficiently well determined.

1. POROMYA GRANULATA, *Nyst* and *Westendorp*. Tab. XXX, fig. 5, *a—f*.

CORBULA GRANULATA. *Nyst* and *West.* Nouv. Rech. Coq. Foss. d'Anv., p. 6, No. 10, pl. 3, fig. 3, 1839.
— ? — *Nyst.* Coq. Foss. de Belg., p. 71, pl. 2, fig. 6, 1844.
— ? — *Jeffreys.* An. and Mag. Nat. Hist., vol. xix, p. 314; and vol. xx, p. 19.
POROMYA ANATINOIDES. *Forbes.* Ægean. Invert. Brit. Assoc. Report, p. 191, 1843.
— GRANULATA. *Forb.* and *Hanl.* Hist. of Brit. Moll., p. 204, pl. 9, figs. 4—6, 1848; and Animal, pl. w, fig. 2, 1853.
EMBLA KORENII. *Lovén.* Ind. Moll. Scand., p. 46, 1846.

Spec. Char. Testâ ovatâ, ventricosâ, subæquilaterali; anticè rotundatâ, posticè truncatâ, et obtusè angulatâ; aculeis minutissimiss criberrimis aspera; umbonibus prominentibus; dente unico obtuso.

Shell ovate, ventricose, slightly inequilateral; anterior side rounded, posterior truncated, with an obtuse keel or ridge retreally from the umbo to the ventral margin; beaks prominent; one obtuse tooth.

Length, $\frac{1}{2}$ inch. *Height*, $\frac{3}{8}$ inch.

Locality. Cor. Crag, Ramsholt, Sutton, and Gedgrave.

Recent, Ægean, British, and Scandinavian Seas.

About a dozen disconnected valves have been obtained by myself, several of them sufficiently perfect for fair comparison, and I have considered them as identical with the Belgian fossil and the Ægean and Scandinavian shell.

The hinge of the right valve is furnished with one large obtuse tooth, situated immediately beneath the umbo, and in the left there is a corresponding cavity between two small prominences for its reception; behind these, and within the dorsal margin, is a depression wherein, I presume, the ligament was placed: this cavity is divided by a small ridge, which appears to have separated the cartilage from the ligament, and the latter probably was visible externally when the valves were closed: there is a small depression on the siphonal side at the dorsal edge, what may perhaps be called the corslet, produced probably by the opening of the valves; but there is no ridge or fulcrum for the support of an *external* ligament. The impressions by the

adductors are rather small and deep, and the mantle-mark has an irregular sinus, by no means large. The shell is beautifully nacreous within, and the exterior is ornamented with papillæ or granulations, studded somewhat like the barrel of a musical box.

In the living state this species has been met with in deep water, while some of its associates in the Coralline Crag are very shallow-water forms. Mr. Jeffreys has dredged it off the Isle of Skye in 50, and Professor E. Forbes obtained it in the Ægean at the depth of 150 fathoms.

At page 148 (*ante*), I had supposed the genus *Thetis* to have been nearly related to *Lucinopsis*, but this allocation is probably incorrect. In Mr. Woodward's 'Rudimentary Treatise of Recent and Fossil Shells,' it is arranged in his family *Myacidæ*. I think, however, the present species, *Poromya granulata*, cannot be correctly placed, as it is there, between the genera *Mya* and *Panopea*.

Corbula gigantea, J. Sowerby, *Thetis gigantea*, Woodward, has a granulated exterior, with an external ligament, and faint or obsolete costæ; and if it be not a true *Pholadomya*, it forms a connecting link between that genus and *Thetis*.

Pandora,* *Brug.* 1792.

Hypogæa and Hypogeoderma (sp.) *Poli.*
Tellina (sp.) *Linn.*
Solen (sp.) *Mont.*

Calopodium. *Bolten*, 1798.
Trutina. *Brown*, 1827.

Generic Character. Shell transverse, inequivalve, inequilateral, ovate or subrhomboidal, externally smooth and of a nacreous texture, gaping at the anterior extremity, one valve flat, the other more or less convex. Hinge with a prominent obtuse tooth upon the right or flatter valve, and a corresponding depression for its reception in the opposite one. Impressions of the adductor muscles subcircular, with a small or scarcely perceptible sinus in that by the mantle. Ligament internal.

The mantle is described as nearly closed, with a small passage for a narrow tongue-shaped foot; and the siphons are represented as very short, united nearly to their orifices, which are fringed, and diverging.

The inequality of the valves and internal ligament have been considered as characters sufficient to approximate this genus to that of *Corbula*, from which, however, it is sufficiently removed, as essential differences exist in the animal inhabitant, but more especially in the composition of its shell. In the examination and report by Dr.

* Etym. *Pandora*, a proper name. This was given also to the inequivalved *Pectens*, probably from their box-like character.

Carpenter, that gentleman seems to think it so peculiar, as almost to constitute a family by itself. He describes the exterior as composed of regular prismatic cells, the axes of the prisms being perpendicular to the surface, while the interior is nacreous.

No well-determined species have been met with in the fossil state in any Formation older than the Paris Basin. A shell from the Carboniferous Series is described by Professor M'Coy under this name; but its claim to a place in this genus is very doubtful.

1. PANDORA INÆQUIVALVIS, *Linn.* Tab. XXV, fig. 5.

TELLINA INÆQUIVALVIS.	*Linn.*	Syst. Nat., ed. 12, p. 1118, No. 56, 1767.
— —	*Poli.*	Test. utri. Sicil., vol. i, p 39, pl. 15, figs. 5, 6, 9, and 7 with the animal.
— —	*Don.*	Brit. Shells, vol. ii, pl. 41, fig. 1, 1800.
PANDORA ROSTRATA.	*Desh.*	2d ed. Lamarck, tom. vi, p. 145.
— —	*G. B. Sowerby.*	Spec. Conch. Pandora, p. 2, No. 2, figs. 7—9.
— —	*Phil.*	En. Moll. Sic., vol. i, pl. 1, fig. 12, 1836.
— —	*Desh.*	Exp. Scient. Algér. Moll., pl. 24, animal.
— —	*Forb.* and *Hanl.*	Hist. Brit. Moll., vol. i, p. 207, pl. 8, figs. 1—4.
— MARGARITACEA.	*Lamk.*	Hist. des An. s. Vert., tom. v, p. 137.
— —	*Schum.*	Essai des Vers. Test., p. 114, pl. 4, fig. 2.
— —	*Turt.*	Brit. Biv., p. 40, pl. 3, figs. 11—14, 1822.
— INÆQUIVALVIS.	*Flem.*	Brit. Anim., p. 466, 1828.

Spec. Char. Testâ elongato-ovatâ, lævigatâ, tenui fragili, inæquilaterali; latere postico longiore, attenuato subrostrato, hinc in utraque valvâ angulato.

Shell elongately ovate, smooth, thin and fragile, inequilateral; posterior side the longer, attenuated, and somewhat beaked, slightly angulated in each valve.

Length, $\frac{5}{8}$ inch. *Height*, $\frac{3}{8}$ inch.

Locality. Cor. Crag, Sutton. Recent, Britain and Mediterranean.

My specimens of this species are but few, and those not in good condition. The one figured has the siphonal area elongated into the form of a rostrum or beak, and corresponds with what the British conchologists have considered a distinct species. In the young state, as indicated by the lines of growth, the dorsal margin is more convex than concave, and the shell comparatively broader, like *P. Pinna*, and there is no appearance then of a rostrum.

2. PANDORA PINNA, *Montague.* Tab. XXV, fig. 4, *a—c.*

SOLEN PINNA.	*Mont.*	Test. Brit., p. 566, t. 15, fig. 3, 1803.
PANDORA OBTUSA.	*Leach.*	Ross's Voy. Baffin's Bay, p. 174, 1819.

PANDORA OBTUSA. *Desh.* 2d ed. Lamarck, tom. vi, p. 145, No. 2.
— — *G. B. Sowerby.* Spec. Conch. (Pand.), p. 2, figs. 1—3.
— — *Phil.* En. Moll. Sic., vol. ii, p. 14, t. 13, fig. 13.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 210, pl. 8, fig. 5; and pl. G, fig. 10, animal.
TRUTINA SOLENOIDEA. *Brown.* Illust. Brit. Conch., pl. 13, fig. 5, 1827.

Spec. Char. Testâ obtusè-elongatâ; latere postico versus extremitatem dilatato; margine dorsali planiusculo.

Shell obtusely elongate; posterior side dilated towards the extremity; dorsal margin nearly straight.

Length, $\frac{5}{8}$ inch. *Height,* $\frac{3}{8}$ inch.

Locality. Red Crag, Walton Naze.

Only two or three specimens of this species have fallen under my observation, and I have, in deference to the malacologists, separated this from what is called *rostrata.* Colonel Montague, who, notwithstanding his having described the two shells under different generic names, was afterwards of opinion that the one was only the younger state of the other. Messrs. Forbes and Hanley consider the characters of the animal, as well as those of the shell, to be quite distinct, and have kept the two forms separate. My own specimens are not sufficiently numerous or perfect to assist in the determination. The two shells are so much alike in the young state as to be with difficulty determinable; and I am inclined to believe with Montague, so far at least in their specific identity, that if the one be not exactly the young state of the other, there is not more than a local variation between the two. Both appear to have existed during the Crag Periods, the *rostrata* in the Cor. Crag corresponding with the more Southern form, while that from the Red Crag resembles the Northern one (probably *P. glacialis,* Leach, 'An. Phil.,' vol. xiv, p. 203, 1819).

NEÆRA,* *J. E. Gray,* 1830.

ANATINA (sp.) *Lamk.*
CORBULA (sp.) *Desh.* 1835.
THRACIA (sp.) *Brown,* 1827.
ERYCINA (sp.) *Risso,* 1826.
CUSPIDARIA. *Nardo,* 1840.

Generic Character. "Shell transversely ovato-pyriform, inequivalve, inequilateral, more or less beaked, and gaping posteriorly; surface smooth or striated, or ribbed longitudinally, never punctated, with or without an epidermis; valves strengthened internally with a longitudinal rib; hinge composed of a cartilage fulcrum, usually oblique, and spatulate in each valve, sometimes with a minute tooth beside it, and a more or less developed lateral tooth on the rostral side of one or both valves; ligament external (?), small; muscular impressions large, pallial with a very shallow sinus.

* Etym. (?) Νεαιρα, proper name. This is also employed for a genus of insects.

"Animal oblong, mantle closed in front, except a plain-edged orifice for the passage of a lanceolate foot; siphons short, united, unequal, the branchial largest, both bearing a few long filiform cirrhi at their sides, extending beyond the orifices; anal siphon with a very extensile membranous valve."—*Forbes* and *Hanley*.

1. NEÆRA JUGOSA, *S. Wood.* Tab. XXX, fig. 7, *a*, *b*.

CORBULA ? SULCATA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ parvâ, transversâ, inæquilaterali, æquivalvi? compressâ, jugosâ; anticè rotundatâ; posticè subrostratâ, et angulatâ; cardine unidentato.

Shell small, transverse, inequilateral, equivalved? compressed, ridged; anterior side rounded; posterior somewhat beaked, and angulated; hinge with one tooth.

Length, $\frac{1}{8}$ inch. *Height*, $\frac{1}{12}$ inch.

Locality. Cor. Crag, Sutton.

This shell is not rare in the Coralline Crag, but as yet I have met with it only in one locality, and never with the valves united.

It much resembles the figure of one of the species from the Paris Basin, *Corbula striarella*, Desh., Coq. Foss. des Env. de Par., tom. i, p. 54, pl. 8, figs. 12—15, but differs in being less than half the size, as well as in other characters; and I believe it to be distinct, depending as I am obliged to do upon the figure and description above referred to.

In our species the hinge of the right valve has one obtuse and somewhat oblique tooth on the anterior side of the umbo, with a depression between it and the dorsal edge, into which fits an elevated portion of the margin of the left valve, while on the siphonal side of this (left valve) is an elongated and elevated projection that interlocks within the dorsal edge of the right valve; between these, and immediately beneath the umbo, is an oblique pit, where the ligament was situated, and *entirely within the shell;* so much so that I doubt whether any part of it could have been seen in the living animal when the valves were closed. The dorsal margin slopes at an angle of about 45°, and a truncated beak is formed by the siphons; the upper part being somewhat elevated producing an obtuse keel from the umbo upon the slope on that side. The exterior has from eight to ten rounded ridges, with depressions or sulci between them of about the same breadth; but upon the younger part of the shells these markings are obsolete, being smooth, or nearly so, about the umbo. The shell is by no means thin, though the ridges are generally visible upon the interior. The adductor-mark on the siphonal side is of a triangular form, and deeply impressed, placed rather backward; and the sinus in the mantle-mark moderately deep.

The provisional name given to it in my 'Catalogue' is obliged to be changed, in consequence of its having been used by Dr. Lovén for a very different species.

2. NEÆRA CUSPIDATA, *Olivi.* Tab. XXX, fig. 6.

TELLINA CUSPIDATA. *Oliv.* Zool. Adriat., p. 101, pl. 4, fig. 3, A—C, 1792.
— — *Broc.* Conch. Foss. Subap., p. 515.
ANATINA BREVIROSTRIS. *Brown.* Ed. Journ. Nat. and Geo. Sci., vol. i, p. 11, pl. 1, figs. 1—4, 1829.
THRACIA BREVIROSTRA. *Brown.* Ill. Conch. Gr. Br., pl. 44, figs. 11—14, 1845.
NEÆRA BREVIROSTRIS. *Lovén.* Ind. Moll. Scand., p. 48, 1846.
— CUSPIDATA. *Forb.* and *Hanl.* Hist. of Brit. Moll., p. 195, pl. 7, figs. 4—6; and pl. G (animal), figs. 4—7, 1848.
— — *Forbes.* Ægean Inv., p. 185.
CORBULA CUSPIDATA. *Phil.* En. Moll. Sic., vol. i, p. 17, t. 1, fig. 19; and vol. ii, p. 12.
— SUBROSTRATA. *S. Wood.* Catalogue, 1840.

A fragment only of a shell, which I consider to belong to this species, was found by myself in the Coralline Crag at Sutton, but it is insufficient for correct description: the peculiar form of the siphonal side (the portion I possess) is so characteristic that it is introduced here without much hesitation. It appears to have belonged to the British or short beaked variety.

CORBULA.* *Bruguière*, 1792.

MYA (sp.) *Linn. Mont.*
CARDIUM (sp.) *Walker* and *Boys.*
TELLINA (sp.) *Olivi.*
ALOÏDES, *Megerle*, 1811.
LENTIDIUM, *Cristof.* and *Jans.* 1832.
POTOMOMYA, *J. Sowerby*, 1835.
AZARA, *D'Orb.* 1839.
CORBULOMYA, *Nyst*, 1843.

Generic Character. Shell suborbicular or ovate, inequivalve, inequilateral, tumid, closed; beaks prominent, recurved surface smooth or striated; in the recent state covered with an epidermis. Hinge composed of one thick, conical tooth in each valve. Ligament internal. Impression by the mantle with a small sinus.

Animal short; mantle open in front for the emission of a thick foot, of considerable magnitude; siphonal tubes short and united to their orifices, which are fimbriated: anal opening with a conspicuous tubular membrane.

Animals constituting this genus are for the most part inhabitants of salt water, but some are estuary species, and extend their range in the river to where the water is quite fresh. A separation has been proposed, under the name *Potomomya*, for those species which permanently inhabit fresh water, but the characters of shell and animal differ in no other respect from those which are truly marine. In this genus, as well as in that of *Pandora*, the two valves are very unequal in size, but this inequality is not confined to the siphonal side of the shell, and the sinus of the mantle-mark does not

*Etym.? *Corbula*, a little basket.

vary in form or magnitude like those so conspicuously shown in some of the *Tellens*.

The species are not very numerous, even when admitting those which constantly inhabit fresh water. They are found sometimes in mud, but more frequently on sandy bottoms, and have a considerable vertical range. Fossil species have been found as early as the Lower Oolite.

1. CORBULA STRIATA, *Walker* and *Boys*. Tab. XXX, fig. 3, *a—d*.

CARDIUM STRIATUM APICIBUS REFLEXIS. *Walk.* and *Boys*. Test. Min. Rar., p. 24, t. 3, fig. 85, 1787.
TELLINA GIBBA. *Olivi*. Zool. Adriat., p. 101, 1792.
— — *Broc*. Conch. Foss. Subap., p. 517, No. 15, 1814.
MYA INÆQUIVALVIS. *Mont*. Test. Brit., p. 38, t. 26, fig. 7, 1803.
CORBULA GIBBA. *Nyst*. Coq. Foss. de Belg., p. 65, pl. 3, fig. 3, 1844.
— — *Lovén*. Ind. Moll. Scand., p. 49, 1846.
— NUCLEUS. *Lamk*. Hist. des An. s. Vert., v, p. 496, 1818.
— — *Forbes*. Report on Ægean Invert., p. 180, 1843.
— — *Phil*. En. Moll. Sic., vol. ii, p. 12, 1844.
— — *Bronn*. Leth. Geogn., p. 967, t. 37, fig. 7, *a—c*. 1838.
— STRIATA. *Flem*. Brit. An., p. 425, 1828.
— — *Desh*. Exped. Scient. Alger., p. 231.
— ROTUNDATA. *J. Sow*. Min. Conch., t. 572, fig. 4, 1827.
— — *Goldf*. Petr. Germ., vol. ii, p. 252, pl. 152, fig. 3, *a—e*, 1842.
— OLIMPLICA. *Costa*. Cat. Syst. e. reg. Test delle 2 Sicil., p. 27, 1829.
— INÆQUIVALVIS. *Macgill*. Moll. Aberd., p. 303, 1843.
— ELEGANS. *Nyst*. Rech. Coq. Foss. Prov. d'Anv., p. 3, 1835.
— BICOSTATA. *Id*. Rech. Coq. Foss. Prov. d'Anv., No. 10, pl. 1, fig. 10.
— PLANULATA. *Id*. Coq. Foss. de Belg., p. 68, pl. 2, fig. 4, 1844.
Not CORBULA STRIATA. *Lamk*.

Spec. Char. Testâ subtriangulari, gibbosâ, subinæquilaterali, valdè inæquivalvi, valvâ dextrâ tumidiori, concentricè striatâ; valvâ sinistrâ complanatâ, sublævigatâ; anticè rotundatâ, posticè truncatâ.

Shell subtriangular, gibbous, slightly inæquilateral, greatly inequivalve, right valve the more inflated, and roughly striated; left valve nearly flat and smooth; anterior side rounded, posterior truncated.

Diameter, $\frac{1}{2}$ inch.

Locality. Coralline Crag, Sutton, Gedgrave, Ramsholt.
Red Crag, Sutton, Bawdsey, Walton Naze.
Recent, Scandinavia, Britain, and Mediterranean.

In the Coralline Crag at Sutton this is one of the most common shells, and although furnished with an apparatus for the firm interlocking of the valves, the two

pieces are not often found in their natural position. In the Red Crag even the separated valves are by no means abundant.

Cardium striatum, of Walker and Boys, is evidently the same as our shell, and Dr. Fleming adopted that name as most entitled to priority: I followed his example in my Catalogue, and see no reason why it should now be changed. In the fossil state, this species is liable to great alteration: the outer coating which forms a perfect shell of itself, with its thick transverse ridges, comes off, leaving the inner portion perfectly smooth. *Corbula planulata*, in Sir Charles Lyell's Cabinet, received from Belgium, with that name, is, I believe, only this species in its exfoliated or decorticated condition.

Sir Charles Lyell, in his paper upon the 'Miocene Deposits of America,' has considered *Corbula elevata*, of Conrad, the same as this species, and judging from the figure by that author, he is probably correct in that assignment.

A single valve, of which I have given a representation (fig. 4), may probably be *C. rosea*, but in such a genus as this, in which the species are by no means easily defined, I prefer leaving it without description for the present.

2. CORBULA COMPLANATA, *J. Sowerby*. Tab. XXX, fig. 2, *a—d*.

CORBULA COMPLANATA.	*J. Sow.*	Min. Conch., t. 362, figs. 7, 8, 1822.
—	—	*Desh.* Coq. Foss. des Env. de Par., pl. 7, figs. 8, 9, 1824.
—	—	*Dujard.* Mem. de la Soc. de France, tom. ii, pt. 2, p. 256, 1837.
—	—	*Desh.* 2d ed. *Lamk.* tom. vi, p. 142, 1835.
—	—	*Grat.* Cat. Zool. des An. du Basin Tert. de la Gironde, p. 67, No. 794, fig. 3, 1838.
—	—	*Bronn.* Leth. Geogr., p. 969, t. 37, fig. 8, *a*, *b*, 1838.
—	DONACIFORMIS.	*Nyst.* Rech. Coq. Foss. de Hoesselt et Kl. Spawen, p. 3, No. 6, pl. 1, fig. 6, 1836.
CORBULOMYA COMPLANATA.		*Nyst.* Coq. Foss. de Belg., p. 59, pl. 2, fig. 2, 1844.
ERYCINA TRIGONA.		*Lamk.* Ann. du Mus., tom. vi, p. 413, No. 3.

Spec. Char. Testâ transversâ, ovatâ, vel donaciformi inæquilaterali, compressâ aut complanatâ, lævigatâ, crassâ; anticè majore rotundatâ; posticè angulatâ, truncatâ, et subcarinatâ; dente cardinali unico in valvâ dextrâ.

Shell transverse, ovate, or wedge-shaped, inequilateral, compressed or flattened, smooth, and thick; anterior side the larger and rounded; posterior angulated, truncated, and slightly keeled; one cardinal tooth in the right valve.

Length, $1\frac{1}{4}$ inch. *Height*, $\frac{3}{4}$ inch.

Locality. Red Crag, Sutton and Walton Naze.

Fossil in the Paris basin, and at Kleyn Spauwen, the Basin of the Gironde, and in the Faluns of Touraine.

This is a rare shell, though solid and strong, and does not appear to have been an inhabitant of the Coralline Crag sea, though a species supposed to have been trans-

mitted from the Older Tertiaries. M. Deshayes says the Paris Basin shell is undoubtedly identical with the Touraine species; the latter corresponds more closely with the Crag fossil; the Kleyn Spauwen shell resembles more (as might be supposed) the Paris Basin variety. The Touraine specimens differ slightly from the Crag fossil, but not, I think, sufficiently to invalidate their identity. In our shell the siphonal side is not so pointed or keeled, and there is a little difference in the dental furniture, and the palleal sinus is a trifle larger.

The ligament is placed in a fossette in the right valve, visible externally, when the valves are closed, through a sinus in the umbo; the left valve has a projection on which are placed both ligament and cartilage, separated by a ridge: before this ligament is a tooth in each valve. This was probably an estuary shell. The locality (Roydon), given for it in 'Min. Conch.,' is an error.

SPHENIA BINGHAMI? *Turton*. Tab. XXIX, fig. 7.

SPHENIA BINGHAMI.	*Turt.*	Brit. Biv., p. 36, t. 3, figs. 4, 5; and t. 19, fig. 3, 1822.
SPHÆNIA BINGHAMI.	*Forb.* and *Hanl.*	Hist. Brit. Moll., vol. i, p. 190, pl. 9, figs. 1—3, 1848.
CORBULA BINGHAMI.	*Hanley.*	Recent Shells, p. 47; Supp., pl. 12, fig. 4.
— —	*Woodw.*	Man. of Moll., vol. ii, p. 318.

Spec. Char. Testâ minutâ, transversâ, cuneiformi tenui fragili, lævigatâ, valdè inæquilaterali; anticè rotundatâ, posticè angustâ, subrostratâ.

Shell small, transverse, wedge-shaped, thin and fragile, smooth, and very inequilateral; anterior side rounded; posterior produced and somewhat pointed.

Length, $\frac{1}{4}$ inch.

Locality. Cor. Crag, Sutton. Recent, Britain?

The genus *Sphenia* has been founded upon a single species of Mollusc inhabiting our own shores, and is at present not well established: the animal has been examined by Mr. Clark who says it is quite distinct from *Mya* or *Saxicava*, though not far removed from either; perhaps still nearer to *Corbula*.

Only two or three specimens, and those not in very good condition, are in my Cabinet; they will not throw any light upon the obscurity which hangs over the recent shell.

My best specimen has a spatulate tooth in the left valve, like that in the young of *Mya*, which it resembles in some characters, but it is much thinner, with something of a nacreous appearance; and the outline also is different from that of the young of *Mya* of the same size: mine is, however, a very doubtful identity of the existing species.

Mya.* *Linnæus*, 1747.

Mya, *Lamk.* 1801.
Sphenia (sp.) *Turt.* 1822.

Generic Character. Shell transverse, equivalve, subequilateral, more or less of an ovate or oblong form, gaping at the siphonal extremity; externally striated or furrowed by rough or irregular lines of growth; in the recent state covered by an epidermis. Hinge composed of a large, projecting, spoon-shaped tooth or process in the left valve, on which is placed the ligament, with a corresponding depression or socket beneath the umbo in the right valve. Impressions of the adductor muscles near the extremities, with a deeply sinuated line in the mantle-mark.

Animal of the form of the shell, with the mantle closed except in front for the emission of a small tongue-shaped foot. Tubes long, covered with a strong case-like coriaceous epidermis, separated at their extremities, with fimbriated orifices.

This genus is more especially characterised by the peculiar form of the hinge, which distinguishes it from all other Bivalves, and as now restricted contains but very few species in the recent state. They are confined to the colder regions of the globe, where they live buried in mud or sand, sometimes to the depth of a foot, in an erect position, with the siphonal extremity upwards, their tubes extending into the water; they have a vertical range from low-water-mark to upwards of 150 fathoms. Dead shells have been obtained from even greater depths, but it is no proof in such case of animals having a very extensive vertical range: Dr. Sutherland has shown, in regard to Arctic species, they are often transported by icebergs into very deep water.

The secondary fossils figured under this generic name have no relationship whatever; but a small species has been obtained from the upper marine of the Older Tertiary Periods that may be referred to this genus, showing then, as now, its somewhat estuary character, or its tendency to approach the regions of fresh-water.

1. Mya truncata, *Linnæus*. Tab. XXIII, fig. 1, *a—f*.

Mya truncata.	*Linn.*	Syst. Nat., ed. 12, p. 1112, No. 26, 1767.
—	—	*Gould.* Invert. Massach., p. 42, 1841.
—	—	*Möller.* Ind. Moll. Groenl., p. 21, 1842.
—	—	*Dekay.* Nat. Hist. New York Moll., p. 240, pl. 29, fig. 289, 1843.
—	—	*Phil.* En. Moll. Sic., vol. ii, p. 6, 1844 (fossil).
—	—	*Lovén.* Ind. Moll. Scand., p. 49, 1846.
—	—	*Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 163, pl. 10, figs. 1, 2; and Animal, pl. H, fig. 1, 1848.

* Etym. μύαξ, a kind of shell-fish.

MYA TRUNCATA. *Middendorff.* Malacozool. Rossica, p. 585, t. 19, figs. 13—15, 1849.
— — *Lyell.* Trans. Geol. Soc., vol. vi, 2d series, p. 137, pl. 17, figs. 5, 6, 1839.
— — *Forbes.* Mem. Geol. Surv., vol. i, p. 408, 1846.
— — *Hancock.* An. and Mag. Nat. Hist., vol. 18, p. 337, 1846.
— — var. PELAGICA. *King.* An. and Mag. Nat. Hist., vol. 18, p. 242.
— OVALIS. *Turt.* Brit. Biv., p. 33, pl. 3, figs. 1, 2, 1822.
— PULLUS. *J. Sow.* Min. Conch., t. 531.
— SWAINSONI. *Lovén.* Ind. Moll. Scand., p. 49, 1846.
SPHENIA SWAINSONI. *Turt.* Brit. Biv., p. 37, pl. 19, fig. 2, 1822.
CHAMA TRUNCATA. *Da Costa.* Brit. Conch., p. 233, pl. 16, figs. 1, 1.
— PHOLAS LATUS. *List.* Hist. Conch., pl. 482, fig. 269.

Spec. Char. Testâ transversâ, subovatâ, inæquilaterali; anticè rotundatâ, tumidâ, clausâ; posticè truncatâ, hiante; cardinis dente porrecto, rotundato.

Shell transverse, subovate, inequilateral; anterior side rounded, inflated, and closed; posterior truncated, and gaping; hinge with one large, rounded tooth.

Length, 3½ inches. *Height*, 2½ inches.

Locality. Cor. Crag, Ramsholt, and Gedgrave.
Red Crag, Sutton.
Mam. Crag. Chillesford, Bridlington.
Clyde Beds, Bracklesham, (*Dixon*).
Recent, British and Scandinavian Seas, Behring Straits.

This shell does not appear to have been rare in the Coralline Crag, the oldest Formation from which I have seen it; nor is it scarce in the Red Crag; and in the more recent Deposit at Chillesford it may be abundantly obtained in great perfection with the valves in their natural position. *Mya pullus* is the young of this species, and not of *arenaria*, as supposed by the authors of the 'Hist. of Brit. Moll.,' vol. i., p. 172. In my 'Catalogue,' I had assigned this as an identity with *M. ovalis*, Turt., and having found this shell in great profusion at Butley, not exceeding it in size, I considered it then as distinct.

This species is subject to considerable variation, more especially in regard to its length: those I have met with from the Coralline Crag are all of the longer variety; in the Red Crag the long and short are both obtained, but I have seen none there so short and obliquely truncated as the variety found fossil at Uddevalla; and in the Clyde Beds.* At Chillesford, all the specimens I have seen are of the longer variety; that is, with the siphonal side somewhat elongated, while, perhaps, it is somewhat

* The difference in the form of the mantle-mark in this variety was considered by the late Mr. G. B. Sowerby as a character of sufficient importance for a distinct position, and Mr. Smith, in consequence, proposed for it the name of *Uddevallensis;* but this mark is merely the result of the shortened side of the shell.

It is now well known that many of the species inhabiting the Arctic seas exhibit great variation, and still more abnormal forms, than are presented by the varieties of this species, have been recently obtained from that part of the world.

remarkable that the specimens of *Panopea Norvegica* found at this locality, where the general remains are decidedly of an Arctic character, have this side much abbreviated.

In the recent state it is found, sparingly, on the coast of the United States; and M. Middendorff* describes it as an inhabitant of the Sea of Okhotsk and the Behring Straits, appearing principally confined to the colder regions of the Northern Hemisphere.

This is the elder of the two species, and has in the living state a great geographical range, extending from the Behring Straits, through the Scandinavian and British Seas, to the coast of the New World westward, through Davis's Straits, and as far as Baring Island, where the short variety has been found in abundance. It is thus spread over an area of 280 degrees of longitude, and its range in depth is upwards of 100 fathoms. It was formerly an inhabitant of the seas which deposited the Sicilian Beds, where it is now found fossil, extending into this region probably during the Glacial Period, as it is no longer an inhabitant of the Mediterranean Sea.

2. MYA ARENARIA, *Linnæus*. Tab. XXVIII, fig. 2, *a—f*.

MYA ARENARIA. *Linn.* Syst. Nat., ed. 12, p. 1112, No. 27, 1767.
— — *J. Sow.* Min. Conch., t. 364, 1822.
— — *Gould.* Inv. Massach., pp. 40 and 359, 1840.
— — *Nyst.* Coq. Foss. de Belg., p. 57, pl. 3, fig. 1, 1844.
— — *Lovén.* Ind. Moll. Scand., p. 49, 1846.
— — *Dekay.* Hist. New York Moll., p. 240, pl. 30, fig. 290.
— — *Midd.* Malac. Rossica, p. 586, t. 20, figs. 1—3, 1849.
— LATA. *J. Sow.* Min. Conch., t. 81, 1815.
— — *W. Smith.* Strata Identif. Crag, fig. 9, 1816.
— SUBOVATA. *Woodw.* Geol. of Norf., p. 43, t. 2, fig. 5, 1833.
— SUBTRUNCATA. *Id.* Geol. of Norf., p. 43, t. 2, fig. 6.
— MERCENARIA. *Say.* Journ. Acad. Nat. Sc., vol. ii, p. 313, fide *Gould.*
— ACUTA. *Say.* Fide *Gould*, p. 40.
CHAMA ARENARIA. *Da Costa.* Brit. Conch., p. 232.
Dale. Hist. and Antiq. of Harwich, p. 293, t. 11, fig. 8, 1730.

Spec. Char. Testâ transversâ, ovatâ, elongatâ, subæquilaterali, crassâ, rugosâ; anticè rotundatâ; posticè subacuminatâ; cardinis dente denticulo laterali acuto.

Shell transverse, ovate, elongate, nearly equilateral, thick, and rough; anterior side rounded; posterior somewhat pointed; hinge tooth with a sharp lateral denticle.

Length, 3½ inches. *Height*, 2½ inches.

Locality. Red Crag, Sutton, Bawdsey, Felixstow.
Mam. Crag, Bramerton, Bridlington.
Bracklesham (*Dixon*).
Recent, Britain, Scandinavia, and N. E. Coast of America.

* The figure by Middendorff is not the short variety.

This species I have not as yet seen from the Lower or Coralline Crag; and although abundant in the Red Crag, I have never found anything but detached valves, and those in the more disturbed portion of that Formation.

It is subject to great variation; and I think, with the authors of the 'Hist. of Brit. Mollusca,' that the shell called *lata* by Mr. Sowerby, above referred to, is only a modified form of this species, although presenting an intermediate character between the truncated posterior of *truncata* and pointed termination of the ordinary form of the living shell, depending probably upon some peculiarly local conditions, as I have never met with it but in one locality. The form of the spatulate tooth in the hinge of this variety is precisely like that of the recent *arenaria*. It was furnished with a large and strong ligament, or rather cartilage, the greater part of which is preserved in most of the fossil specimens.

The cause assigned for this variation (*lata*), by the authors of the 'Hist. of Brit. Mollusca,' appears to me to be somewhat doubtful, this not being, I believe, one of the forms found in the estuary portion of the Mammaliferous Crag, where distortions are by no means rare, and where, in all probability, the influx of ice or the efflux of more than ordinary quantities of fresh water, produced deformities like some of the specimens of *Purpura lapillus* and *Littorina littorea*, found in that Deposit. The variation in *lata* does not appear to be a distortion, as understood in this case, but a character that pervaded a whole race, making it what is called a permanent variety.

The depth of the palleal sinus is a character here not to be much depended upon, as, in my large series, considerable differences in regard to depth may be observed; for in some specimens this mark extends considerably beyond the hinge ligament, while in others it falls short of it, being modified by the length of the tubes, which would probably vary under the influence of external conditions.

This, in the living state, is generally a very shallow-water species, burying itself in sand, near low-water mark; extending, at times, into rivers as far as where the water, when the tide is out, is nearly fresh. Its geographical distribution takes in the whole circuit of the Northern Hemisphere, being found, according to Middendorff,* at Sitka, in the Sea of Okhotsk, on the coast of Russian Lapland, and Nova Zembla, and, by the American authors, on the soast of the United States, as far to the southward as nearly to 40°, exhibiting thus an equal, or perhaps a greater, extent of range than its elder confrère, *truncata*. It has not had, however, on our side of the Atlantic, quite so great a range to the southward, not having been found, either recent or fossil, in or near the Mediterranean.

The animal of this species is, according to Dr. Gould, extensively employed as bait in the cod fisheries of Newfoundland, and is called the long clam, to distinguish it from the giant clam, *Mactra gigantea*, or the round clam or Quahog, *Venus mercenaria*.

* The specimen figured by Middendorff appears rather distorted, with a short siphonal side.

PANOPEA.* *Menard de la Groye*, 1807.

MYA (sp.) *Linn. Broc.*
CHAMÆPHOLAS (sp.) *Petiver.*
GLYCIMERIS. *Lamk.* 1812.
PANOPÆA. *Goldf. Phil. Bronn. Valenciennes.*
PANOPIA. *Swains.* 1840.
PANOPOEA. *Nyst*, 1844.
HOMOMYA (sp.) *Agass.* 1845.

Generic Character. Shell transversely oblong, equivalved, inequilateral, more or less gaping at both extremities; surface smooth or marked by rough and somewhat irregular lines of growth; elongated impressions by the adductors; mantle-mark with a large, deep sinus; hinge furnished with one conical tooth in each valve; ligament external, placed on a prominent fulcrum.

Animal with very long and extensible siphonal tubes united to their extremities; mantle closed throughout its length, except a small opening in front for the passage of a short, stout, muscular foot; large and strong adductor muscles.

This genus is closely related to *Mya*, in the animal as well as in the shell, differing principally by the position of the hinge-ligament, which in this is placed upon a prominent ridge, and its action consequently different. The animal has very long siphonal tubes, which are incapable of being withdrawn into the shell, and are consequently thickened, and covered with a strong coriaceous epidermis.

In 1839, M. Valenciennes published a valuable monograph of this genus, and described the animal of one species found on the shore of Port Natal, which seems to have been an inhabitant of shallow water, and left dry at the retreat of the tide. Its tubes were observed protruding through the sand, and when alarmed retreated backward by means of its powerful foot to the depth of several feet.

Some of the Oolitic Fossils belong to this genus.

Dr. Gray considers the name of *Glycimeris*, proposed by Klein, 1753, as entitled to be used for this genus, but the date is anterior to our starting point, viz. the 12th ed. Linn., 1767.

1. PANOPEA NORVEGICA, *Spengler*. Tab. XXIX, fig. 1, *a—e*.

MYA NORVEGICA. *Speng.* Skrivt. Natu. Silskal, vol. iii, part 1, p. 46, pl. 2, fig. 18.
GLYCIMERIS ARCTICA. *Desh.* 2d ed. Lamarck, tom. vi, p. 70, 1835.
— NORVEGICA. *Gray.* List Brit. Moll., p. 63, 1851.
PANOPEA GLYCIMERIS. *Bean.* Mag. Nat. Hist., viii, p. 562, figs. 50, 51.

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* Etym. *Panope*, one of the Nereids. *Panopea*, Hubn. 1816, a genus of *Lepidoptera*.

Panopea arctica.	*Gould.*	Inv. Massach., p. 37, fig. 27, 1840.
— —	*Dekay.*	Nat. Hist. New York Zool., p. 246, 1843.
— —	*King.*	Ann. and Mag. Nat. Hist., vol. xviii, p. 243, 1846.
Panopæa Bivonæ.	*J. Smith.*	Wern. Mem. vol. viii, p. 107, pl. 2, fig. 4, 1839.
— —	*Phil.*	En. Moll. Sic., vol. i, p. 8, t. 2, fig. 1, *a*—*c*, 1836.
— Spengleri.	*Valen.*	Arch. du Mus., tom. i, p. 15, pl. 5, fig. 3, 1839.
— —	*Chenu.*	Illust. Conch. Panopæa, pl. 4, fig. 2, 4, 4 *a*, 4 *b*; pl. 6, fig. 3, *a*, *b*; and pl. 10, fig. 2, *a*, *b*.
— Norvegica.	*J. Sow.*	Min. Conch., t. 610, fig. 2, and 611, figs. 1, 2.
— —	*Lovén.*	Ind. Moll. Scand., p. 49, 1846.
— —	*Forb.* and *Hanl.*	Hist. Brit. Moll., vol. i, p. 175, pl. 11, 1848.
— —	*Middend.*	Malacozool. Rossica (Mem. *loc. cit.*), p. 593, t. 20, fig. 11, 1849.

Spec. Char. Testâ crassâ, oblongâ vel subrhomboidali, plus minusve inæquilaterali; anticè plerumque breviore, porticè truncatâ et latiore; cardine edentulo? impressione pallii, interrupta, maculosa.

Shell thick, oblong or somewhat rhomboidal, more or less inequilateral; anterior side generally the shorter, posterior truncated and broader; hinge without teeth; impression by the mantle interrupted, spotted and irregular.

Length, 3 inches. *Height*, 2 inches.

Locality. Red Crag, Sutton, Butley.
Mam. Crag, Chillesford, Bridlington.
Clyde Beds, and Sicily.

Recent, North America, Britain, Scandinavia, Russian Lapland, and Sea of Ochotsk.

As yet this shell has been but sparingly obtained from the Red Crag, but it does not appear to be very scarce in the native bed at Chillesford, where the valves are met with in their natural position. Although my specimens from the Red Crag do not amount in number to more than half a dozen, there is a considerable variation among them.

Our fossils are in general more equilateral, that is to say, the siphonal side of the shell is less in size, particularly those from Chillesford, than the living specimens, or those from the newer Tertiaries of Sicily, where the anterior side does not constitute more than a third of the entire shell; there is, however, no doubt as to the identity of the British fossil with the recent species. Among other minor differences may be mentioned the ligamental fulcra, which in Crag specimens extend half way across the dorsal margin, giving support to large and powerful ligaments, while in the living shell this fulcrum is much smaller. The adductor muscle-marks are deeply impressed, the shell gapes widely on the posterior side, and there is a considerable opening in the fore part of the ventral margin for the extrusion of the foot: the surface is much roughened by somewhat irregular lines of growth; and the centre of the shell is contracted or depressed, giving it a couple of obtuse ridges which diverge from the umbo.

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In the living state it has been only obtained in deep water.

A small obtuse tooth occupies a position immediately beneath the umbo in the living shell, but in the fossil this is merely rudimentary.

The figure by Middendorff has the siphonal side the larger.

2. PANOPEA FAUJASII, *Menard de la Groye.* Tab. XXVII, fig. 1, *a—f.*

PANOPEA FAUJASII.	*Men. de la Groye.*	Ann. du Mus., tom. ix, p. 131, t. 12, 1807.
— —	*Dubois de Montp.*	Conch. Foss. de Wolhyn. Podol., p. 51, pl. 4, figs. 1—4, 1831.
PANOPÆA FAUJASII.	*Bast.*	Foss. de Bord., p. 95, 1825.
— —	*Bronn.*	Leth. Geog., p. 973, pl. 37, fig. 6, 1838.
— —	*Phil.*	En. Moll. Sic., vol. i, p. 7, t. 2, fig. 3, 1836.
— —	*Goldf.*	Pet. Germ., vol. ii, p. 274, t. 159, fig. 1, *a—d.*
— —	*Valenciennes.*	Arch. du Mus., vol. i, p. 13, 1839.
— —	*J. Sow.*	Min. Conch., t. 602, figs. 3—5.
— —	*Chenu.*	Conch. Illust., pl. 4, fig. 1, 1.
— IPSVICIENSIS.	*J. Sow.*	Min. Conch., t. 611, figs. 3, 4.
— —	*Valenciennes. Loc. cit. sup.,*	No. 36.
— REFLEXA.	*Say.*	Journ. Acad. Nat. Sc., vol. iv, p. 153, pl. 13, fig. 4, 1824.
— —	*Conrad.*	Foss. Med. Tert., p. 5, pl. 3, fig. 4, 1838.
— AMERICANA.	*Id.*	Foss. Med. Tert., p. 4, pl. 2.
— ALDROVANDI?	*Phil.*	En. Moll. Sic., vol. i, p. 7, t. 11, fig. 2.
— GENTILIS.	*J. Sow.*	Min. Conch., vol. vii, t. 610, fig. 1, 1840.
MYA PANOPÆA?	*Broc.*	Conch. Foss. Subap., p. 532, 1814.

Spec. Char. Testâ transversâ, ovato-oblongâ, inflatâ; plus minusve inæquilaterali; posticè truncatâ et valdè hiante; cardine unidentato.

Shell transverse, ovately oblong, inflated, more or less inequilateral; posterior side truncated, and gaping widely; hinge with one tooth.

Length, 6 inches. *Height,* $3\frac{1}{2}$ inches.

Locality. Cor. Crag, Sudbourn, Gedgrave, Ramsholt.
Red Crag, Sutton.

This handsome shell is very abundant as a Crag Fossil, though its great size and comparative thinness has caused it to be somewhat scarce in our Cabinets: at Ramsholt numerous specimens were found with the valves united. It presents a very considerable variation, both in regard to its form, and to the degree of gape on the anterior side, and I am inclined to believe the recent Mediterranean shell called *P. Aldrovandi* is merely the descendant of our Crag species somewhat altered by local conditions: the Sicilian fossil (specimens of which were obligingly given to me by Madame Power) seems to present some differences; but they are not, I think, of sufficient importance for specific distinction; that shell is, in general, rather more inequilateral than the Crag one, but not always so; and, among my British specimens

a considerable variation in that character may be observed. Great reliance has been placed upon the size of the gape for the foot on the anterior side, but I believe such distinction to be of very little value, as in some of my specimens it is nearly closed, while in others it is widely open, and with all intermediate magnitudes. The variety *Ipsviciensis*, found at Ramsholt, appears to differ most from the Sicilian shell, and may be considered its extreme range in variation, being more equilateral and straight; but some of my specimens from near Orford, have nearly the same inequilaterality as the Sicilian fossil, with the like obliquity. In *P. Norvegica*, a difference exists between the comparative magnitudes of the two sides of the recent, as well as between the Sicilian fossil, and my specimens from Chillesford, equally evident with what may be seen in this species; and the comparatively greater depth of the sinus results, I conceive, in this difference between the two sides, the sinus reaching further back, or apparently deeper, in those which are more equilateral than where the siphonal side is so much the larger. Similar differences exist in *Mya truncata;* what has been called *M. Uddevallensis* has one side of the shell very short, giving a material difference in proportional dimensions from some undoubtedly of the same species from the Coralline Crag, as well as from the more southern portion of the English Coast, as if a northern locality had induced an alteration in that character.

I have given figures of the specimen from the Red Crag, called *P. gentitis* (fig. 1, *d*, *e*), which Mr. Sowerby considered as a distinct species. With the exception of its being a little more elongated, its characters are so similar to those of fig. 1, *a*, that I believe it to be only an aberrant form of the one abundant in the Coralline Crag. The apparent greater depth in the sinus of the mantle-mark, in this specimen, I would attribute entirely to its elongated and constricted form: a considerable difference in the siphonal scar may be observed in a large series depending in a great degree upon the outward form of the shell.

Figs. 3, 4, 5, of the 'Mineral Conchology,' t. 602, are probably fragments of this; but figs. 1 and 2, of the same Plate, described under the name of *P. Faujas*, belong, I believe, to another species.

Saxicava.* *Fleureau de Bellevue*, 1802.

Mytilus (sp.) *Linn. Mont.* &c.
Solen (sp.) *Linn. Mont.* &c.
Mya (sp.) *Linn. Fabr.* &c.
Donax (sp.) *Poli.*
Anatina (sp.) *Turton.*
Cardita (sp.) *Bruguière.*
Irus (sp.) *Oken.*
Chamæpholas (sp.) *Lister.*
Arcinella (sp.) *Phil.* 1844. Not *Schum.*
Hiatella. *Dand.* 1800. *Gray*, 1851.
Clotho? *Fauj. St. Fond.* 1807.
Byssomia. *Cuv.* 1817.
Didonta. *Schum.* 1817.
Pholeobia. *Leach*, 1819.
Biapholius. *Id.* 1819.
Rhombus. *Blainv.* 1818.
Agina. *Turt.* 1822.
Rhomboides. *Blainv.* 1825.

* Etym. *Saxum*, a rock; and *cavo*, to make hollow.

Generic Character. Shell transverse, inequilateral, oblong, or subrhomboidal, equivalve, slightly gaping at both extremities, sometimes in front; hinge with one or two cardinal teeth, which are generally obsolete when full grown; muscular impressions ovate, strong, and distant; palleal impression somewhat irregular, with a small or moderate sinus. Ligament external.

Animal oblong, or club-shaped; mantle united, except where open in front for the passage of a digitiform foot, furnished with a byssal groove; siphons short, separated at their extremities; branchial and anal orifices large, margined with cirrhi.

Animals of this genus are generally found located in rocks, as the name imports, and they are often met with in those situations into which they must have entered at a very early age, their extrication being effected only by a fracture of the stone from depths of sometimes nearly six inches. It is therefore evident this aperture is formed by the animal itself, and as the crypts are not symmetrical, like those of the *Pholades*, the mechanical theory of a rotatory motion, by the rasping of the shell, will not in this instance satisfactorily explain the *modus operandi*. They appear endowed with the power of spinning a byssus, by which they are sometimes moored to the sides of the cells, and occasionally the ventral opening is of considerable size; from which circumstance a genus was formed by Baron Cuvier, under the name *Byssomya*, for the reception of those shells possessing this character.

Their peculiar habits producing often great distortion, and their extraordinary variation, have caused much perplexity to the naturalist; the same species has, I believe, been placed in five different genera; and the most distinguished conchologists of the present day are still at variance, not only in the determination of the species to which the shells now found on our own coasts should be assigned, but even the generic limits cannot be agreed upon. A small shell from the Older Tertiaries of this country is in the Cabinet of Mr. Edwards, probably belonging to this genus; and M. Deshayes has described some species from the Paris Basin.

1. SAXICAVA RUGOSA, *Pennant.* Tab. XXIX, fig. 3, *a—g.*

MYTILUS RUGOSUS. *Penn.* Brit. Zool., ed. 1, vol. iv, p. 110, t. 63, fig. 72.
— PHOLADIS. *Müll.* Zool. Dan., t. 87, figs. 1—3.
— — *Chemn.* Conch. Cab., vol. viii, p. 154, t. 82, fig. 735.
MYA BYSSIFERA. *Otho. Fabr.* Faun. Groenl., p. 408, No. 8.
— RUSTICA. *Broc.* Conch. Foss. Subap., p. 533, t. 12, fig. 11, 1814.
SAXICAVA RUGOSA. *Forb.* and *Hanl.* Brit. Moll., vol. i, p. 146, pl. 6, figs. 7, 8; and pl. F, fig. 6.
— — *Lyell.* Trans. Geol. Soc., 2d series, vol. vi, pl. 16, fig. 7, 1839.
— — *J. Sow.* Min. Conch., t. 466.
— — *Phil.* En. Moll. Sic., vol. i, p. 20, t. 3, fig. 4, 1836.
— STRIATA. *Fl. de Bellevue.* Journ. de Phys., tom. liv, p. 349, 1802.
— GALLICANA. *Desh.* 2d ed. Lamarck, tom. vi, p. 162, 1835.

SAXICAVA PHOLADIS. *Turt.* Brit. Biv., p. 21, t. 2, figs. 11, 1822.
— — *Hancock.* Mag. Nat. Hist., vol. xviii, p. 337.
— DISTORTA. (*Say.*) *Gould,* Inv. Massach., p. 61, fig. 40.
— SULCATA. *Smith.* Phil. Trans., 1835, pl. 2, fig. 25.
PHOLEOBIA RUGOSA. *Leach.* Ross's Voy. Baff. Bay, p. 174, 1819.
BIAPHOLUS RUGOSUS. *Leach* MS. An. and Mag. Nat. Hist., vol. xx, p. 272.
BYSSOMYA PHOLADIS. *Bowdich.* Bivalves, fig. 43.
RHOMBOIDES RUGOSUS. *Blainv.* Man. Malac., p. 573, 1825.
HIATELLA OBLONGA. *Turt.* Brit. Biv., p. 25, pl. 2, fig. 13, 1822.
— RUGOSA. *Flem.* Brit. An., p. 461, 1828.

Spec. Char. Testâ variabile, oblongâ, vel subrhomboidali transversim striatâ, rugosa; utraque extremitate obtusâ, aliquando valvarum angulis binis instructo: latere antico brevissimo.

Shell variable, oblong or subrhomboidal, transversely striated, and rugose; obtuse or rounded at each extremity; sometimes furnished with two diverging rows or slightly imbricated ridges; anterior side much the shorter.

Length, 1 inch. *Height,* $\frac{5}{8}$ inch.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton, Walton Naze.
Clyde Beds, Bridlington.
Recent, Britain, Mediterranean, Scandinavia, N. E. Coast of America, Nova Zembla, Sea of Ochotsk, and Sitka.

Small specimens of this shell are abundant in the Cor. Crag. In the Red Crag they are sometimes met with, in loose sand, with the valves united, much distorted, and with a large, ventral opening. The gigantic specimens obtained in the Clyde Beds, and in the recent Deposits of Canada, belong, I believe, to nothing more than a variety of this species, where, apparently under favorable circumstances, it had attained to so great a magnitude; but one of my specimens from the Red Crag is not much less, giving every reason to suppose the simple difference in size, if not merely a difference in age, may be the result of different conditions; the Red Crag specimens bearing in general a sort of intermediate character, as if a reduction in temperature from the older to the more modern Periods had been favorable to the fuller development of this species.

Large numbers of individuals are found loose in the Crag, and when in a living state, probably passed their lives in adhering by a byssus to the roots of *Fuci.* Mr. Sowerby, in 'Min. Conch.,' speaks of a specimen having been found imbedded in Septaria, beneath the Red Crag at Holywells. I have never met with the British fossils otherwise than in localities where, I believe, they were not excavators. This species appears to be generally distributed through the Drift Beds in this country, and it is also found in similar Deposits in Canada, Sweden, and Russia. Mr. Smith, of Jordan Hill, has recently forwarded to me the drawing by the late Professor E. Forbes,

of an individual measuring $1\frac{3}{4}$ inch long, and $\frac{7}{8}$ths of an inch high, which was thought to be distinct from *rugosa*, and called *striata*. I cannot coincide in that opinion; it appears to me to be only a monstrous form of our variable shell.

2. SAXICAVA ARCTICA, *Linnæus*. Tab. XXIX, fig. 4, *a—b*.

MYA ARCTICA. *Linn.* Syst. Nat., ed. 12, p. 1113.
CARDITA LITHOPHAGELLA. *Costa.* Fide *Phil.*
MYA ELONGATA. *Broc.* Coq. Foss. Subap., p. 529, t. 12, fig. 14, *a*, *b*, 1814.
HIATELLA ARCTICA. *Daud.* Rec. Mem. Moll., 1800.
ANATINA ARCTICA. *Turt.* Brit. Biv., p. 49, pl. 4, figs. 7, 8, 1822.
SAXICAVA ARCTICA. *Phil.* En. Moll. Sic., vol. i, p. 20, t. 3, fig. 3, 1836.
— — *Lovén.* Ind. Moll. Scand., p. 40, 1846.
— — *D'Orbigny.* Moll. Canar., p. 109, No. 195, 1835.
— — *Nyst.* Hist. Coq. Foss. Belg., p. 95, pl. 3, fig. 15, *a—c*, 1844.
— RUBRA. *Desh.* Expéd. Algér. Moll., pl. 66, figs. 18, 19.
SAXICAVA RHOMBOIDES. *Desh.* 2d ed. Lamarck, tom. vi, p. 153, 1835.
SOLEN MINUTUS. *Linn.* Syst. Nat., ed. 12, p. 1115, No. 42.
— — *Mont.* Test. Brit., p. 53, pl. 1, fig. 4, 1813.
— PURPUREUS. *Flem.* Brit. An., p. 459, 1828.
HIATELLA MINUTA. *Turt.* Brit. Biv., p. 24, pl. 2, fig. 12, 1822.
— — *Gray.* List. Brit. Moll., p. 89, 1851.
TELLINA RHOMBOIDES. *Poli.* Test. Sicil., p. 81, t. 15, figs. 12, 13, 15; and t. 14, fig. 16.
DONAX IRUS. *Olivi.* Fide *Philippi.*
MYTILUS PRÆCISUS. *Mont.* Test. Brit., p. 165, t. 4, fig. 2, 1803.
PHOLEOBIA PRÆCISA. *Brown.* Illust. Brit. Conch., t. 9, fig. 16.
AGINA PURPUREA. *Turt.* Brit. Biv., p. 54, t. 4, fig. 9.
DIDONTA BICARINATA. *Schum.* Essai, p. 125, pl. 6, fig. 2, *a*, *b*, 1817.
BIAPHOLIUS SPINOSUS. "*Leach.*" Ann. Mag. Nat. Hist., vol. xx, p. 272.
HYPOGÆA GIBBA. *Poli.* Test. Sic., vol. i, p. 251.

Spec. Char. Testâ crassâ, oblongâ, vel rhomboidali, valdè inæquilaterali; concentricè striatâ, aut rugosâ; latere antico brevissimo; biseriatim obliquè aculeis instructo: cardine unidentato.

Shell thick, oblong or rhomboidal, very inequilateral; rugose or irregularly striated with lines of growth; anterior side very short; ornamented with two diverging imbricated ridges: hinge with one tooth.

Length, $\frac{5}{8}$ inch. *Height*, $\frac{3}{8}$ inch.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton.

Recent, Canary Islands, Mediterranean, Ægean, British and Norwegian Seas.

In deference to the malacologists, I have separated these two shells, and placed them as distinct species, under the names *arctica* and *rugosa*, though I believe there is no ground for the distinction.

The form of the shell, and the inequilaterality of the valves are not to be depended upon for specific separation, neither can any reliance be placed upon the two diverging ridges upon the siphonal side, though strongly marked in this, where often these ridges are imbricated; the same character may generally be detected in the younger portion of the preceding, becoming obliterated in the older shell, and what is called the excavated lunule,* which is said by the recent conchologists to be the tangible mark of distinction between the two, is as prominent and evident in the one as in the other.

The remark made by Dr. Gould upon *Saxicava distorta* may be also applied to our fossils: "it is a perfect Proteus, of which no description can be given that is not liable to mislead." The American shell being probably only a variety of a species that seems to have a geographical extension reaching from the Ægean to the northernmost shores of Finmark, and the N.E. coast of America.

Saxicava bilineata, Conrad, 'Foss. of the Mid. Tert. of the United States,' p. 18, Pl. 10, fig. 4, is probably another variety of this species.

The only imprisoned specimen I have ever found in the Crag, was in the interior of one of the large barnacles. I have a recent individual from the Bay of Smyrna, it was imbedded in sponge.

3. SAXICAVA ? FRAGILIS, *Nyst.* Tab. XXIX, fig. *a*—*e*.

SAXICAVA FRAGILIS. *Nyst.* Coq. Foss. de Belg., p. 97, pl. 4, fig. 10, *a*, *b*, 1844.
? — RUGOSA, juv.? *Forb.* and *Hanl.* Hist. Brit. Moll., vol. i, p. 149, pl. 6, figs. 1—3, 1848.
— — var. *Gray.* List Brit. Moll., p. 88, 1851.
SPHENIA CYLINDRICA. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ oblongâ, vel subcylindraceâ tenui, fragili, inæquilaterali, lævi (præter strias incrementi irregulares) latere postico obtusè angulato; cardine unidentato.

Shell oblong, or subcylindrical, thin, fragile, inequilateral, smooth (except the irregular lines of growth); posterior side with an obsolete, angular ridge; one cardinal tooth.

Length, $\frac{3}{4}$ inch. *Height*, $\frac{3}{8}$ inch.

Locality. Cor. Crag, Sutton.

Very abundant. All my specimens were found free and loose in the sand with the valves separated.

Our shell in its young state is furnished with one cardinal tooth, and a depression for its reception in each valve; and, like *Saxicava*, these teeth become obsolete when

* There is no distinct lunule in these shells, the appearance of such is produced simply by an obsoletely-curved ridge in the shell, on the anterior side.

the shell is full grown. There is a small sinus in the mantle-mark, and the impressions of the adductors are very distinct. Within these, on both sides, a ridge diverges from beneath the umbo; that on the anterior side is the more prominent. The ligament appears to have been supported upon a prominent fulcrum, while the cartilage was placed in a depressed line upon the dorsal edge, and there is a small gape on the siphonal side.

The shell above referred to, in the 'Hist. of Brit. Moll.,' may possibly be the descendant of our fossil, as I had supposed when compiling my Catalogue, (Ann. and Mag. of Nat. Hist., 1840, p. 245, *infra*), but several dead valves of the recent species, since obtained from the beach on Stone Point, at Walton Naze, cast a doubt upon that identification, the recent shell having the siphonal side much broader than the anterior, and is not quite so flat.

I have no doubt of our fossil being distinct from *Saxicava arctica*, nor do I think there is any good reason for believing it to be the fry of some larger species. It is difficult to determine where it ought to be placed, but it appears to conform more nearly with the diagnosis of *Saxicava* than with any other existing genus. I would have adopted *Arcinella*, proposed by Philippi for the succeeding species, but that this name had been twice previously used in the class *Mollusca*; and *Sphenia*, the genus in which I had provisionally placed it, has a different hinge with an internal ligament like that of *Mya*, placed upon a spatulate projection.

3. Saxicava? carinata? *Brocchi.* Tab. XXIX, fig. 5, *a—e.*

Mytilus carinatus? *Broc.* Coq. Foss. Subap., p. 585, t. 14, fig. 16.
— — ? *Goldf.* Pet. Germ., p. 179, pl. 131, fig. 14.
Arcinella carinata. *Phil.* En. Moll. Sic., vol. ii, t. 16, fig. 9.
Sphenia angulata. *S. Wood.* Catalogue, 1840.

Spec. Char. Testâ minutâ, transversâ, oblongâ, valdè inæquilaterali, tenui, fragili; anticè brevi, posticè carinatâ, angulatâ, productâ, granulosâ; cardine unidentato.

Shell minute, transverse, oblong, very inequilateral, thin, and fragile; anterior side short, posterior angulated, carinated, and produced, with a granular surface; hinge with one tooth.

Length, $\frac{1}{2}$ inch. *Height*, $\frac{1}{4}$ inch.

Locality. Cor. Crag, Sutton.

A few specimens only of this species have come under my observation, and those are all in my own cabinet.

The shell it most resembles is the preceding, from which, however, it differs in having the siphonal side much more angular, pointed, and carinated, with also a roughened or shagreen-like exterior, most distinctly visible on the posterior slope.

There is one obtuse tooth, most prominent in the right, with a corresponding depression in the left valve, and the anterior muscular impression is of an ovate form, deeply impressed.

I have assigned it, with some degree of doubt, as an identity with the Italian fossil, depending upon the very imperfect figure by Brocchi. It accords with his description, except that it is not "smooth," as he describes it; but some of my specimens appear to have lost their granular exterior, and this may have been the case with the sub-Apennine fossil.

An American shell from the Older Tertiaries, *Byssomya petriculoides*, Lea, 'Contrib. to Geol.,' p. 48, pl. 1, fig. 16, though evidently distinct, more nearly approaches this species than *Saxicava arctica*, to which it has been considered to have belonged.

Philippi has given the representation of a fossil under the name of *Arcinella carinata*, which I have considered as this species, and he refers to *Mytilus carinatus*, Brocchi; but there is no description to assist in its determination, and my dependence is entirely upon his figure. *Arcinella lævis*, of the same author, vol. ii, p. 54, t. 16, fig. 10, probably belongs to a different genus; it looks like the left valve of *Montacuta bidentata*.

Glycimeris,* *Lamk.* 1801.

Cyrtodaria. *Daudin*, 1792. Fide *Gray*.

Generic Character. Shell equivalved, inequilateral, elongately oblong, thick, strong, flattish or compressed, gaping widely at each extremity. Hinge edentulous; ligament external. In the recent state covered with a thick epidermis. Two deep impressions by the adductor muscles, with a small sinus in the rugged and irregularly-shaped mantle-mark.

Animal of the form of the shell, with the lobes of the mantle thick, and the edges, united, except immediately in front, where there is an opening for the passage of a small cylindrical foot; siphons united to their extremities, thick, and fleshy, with a wrinkled epidermis, and incapable of being withdrawn into the shell; orifices fringed; branchiæ long and thick, two on each side.

One recent species only of this genus has yet been noticed, and that has been long known. It is an inhabitant of the arctic regions, and the N. E. Coast of America, but not met with in our own seas. The animal of this has been examined by M. Audouin, and its details published in the 'Ann. des Sc. Nat.,' 1833, from which it appears to have somewhat of an isolated position. M. de Blainville placed it among the *Naiades*. In the shell and its hinge-furniture it has considerable resemblance to *Panopea Norvegica*.

In Mr. Edwards's cabinet is a species from the lower division of the Older Tertiaries.

* Etym. γλυκις, dulcis, and μερις, a species so called by Pliny from its sweet taste.

1. GLYCIMERIS ANGUSTA, *Nyst* and *Westendorp*. Tab. XXIX, fig. 2, *a—d.*

GLYCIMERIS ANGUSTA. *Nyst* and *West.* Nouv. Rech. Coq. Foss. d'Anv. (Bull. de l'Acad. des Sc. de Bruxelles, tom. vi, 1839), p. 4, pl. 1, fig. 1.
— — *Nyst.* Coq. Foss. de Belg., p. 55, pl. 11, fig. 1, 1844.
— VAGINA. *S. Wood.* Catal. of Crag Shells in Ann. and Mag. Nat. Hist., vol. vi, p. 245, 1840.
— = *J. Sow.* Min. Conch., t. 636, 1844.

Spec. Char. Testâ elongato-óblongâ, crassâ, rugosâ, tortâ, valdè inæquilaterali; posticè breviore, truncatâ, subangulatâ; anticè productâ, attenuatâ; valvis intus incrassatis.

Shell elongately oblong, thick, rough and twisted, and very inequilateral; posterior side the shorter, truncated, and somewhat angular; anterior produced, slightly pointed; valves thickened within.

Length, 4 inches. *Height*, $1\frac{1}{2}$ inch.

Locality. Cor. Crag, Gedgrave, Sudbourn, and Ramsholt.
Red Crag, Sutton.

This strong shell is by no means rare in the Coralline Crag, and fragments of it are not unfrequently met with in the Red Crag. Some differences exist between this and the recent species, *Mya siliqua*, Chemn., vol. ii, p. 192, t. 198, fig. 1934; the siphonal side being shorter in the Crag shell, as well as broader, and the anterior more pointed; there is also a greater twist or contortion in the valves, and the muscular impressions are somewhat different; that of the anterior adductor is more elongated, increasing in breadth towards the anterior, and extending to the verge of the impression by the mantle on that side; the posterior adductor is situated further backward than in the recent shell, almost touching the extreme edge, below which is the small sinus of the mantle-mark. The shell is much twisted, so that the valves, when united, touch only at the hinge and basal edge of the anterior margin. There is a large and prominent fulcrum for the ligament, extending nearly to the posterior extremity of the shell; between it and the umbo is a cavity for the cartilage, with a callosity or obscure tooth immediately under the beak.

There is a slight appearance of erosion at the umbones of some of my specimens, and the exterior is smooth, with the exception of lines of growth. Traces of irregular lines may be sometimes seen both longitudinally and transverse; these were probably produced by the rugosities of its thick epidermis.

In this, contrary to the generality of Bivalves, the siphonal side is much the shorter of the two.

A recent species of this Genus is in the cabinet of my friend J. W. Flower, Esq., said to be from Moreton Bay. It approaches rather nearer to our fossil than does the Arctic shell, in having a greater twist, but it differs also slightly in form.

GASTROCHÆNA,* *Spengler*, 1783.

UPEROTUS (part). *Guettard*, 1774.
CHÆNA (part). *Retzius*, 1788.
MYA (sp.) *Pennant*.
PHOLAS (sp.) *Chemn. Poli*.
FISTULANA (sp.) *Brug*. 1792.
TRAPEZIUM (sp.) *Megerle*, 1811.
GASTROCHINA. *Swains*. 1840.

Generic Character. Shell equivalve, inequilateral, oval or wedge-shaped, with a large ventral opening; hinge linear; a single laminated obscure tooth in each valve. Ligament external.

Tube calcareous, pyriform; posterior opening narrow, with a bipartite or divided aperture.

Animal cuneiform, siphons united to their extremities, orifices fringed, mantle closed, with the exception of an opening for a small, finger-shaped, curved, and pointed foot, sometimes furnished with a delicate byssus.

Animals of this genus are generally enclosed in the thick shelly substance of some mollusc, or in the centre of a mass of coral, their excavations being produced by an operation of the animal itself. The mode by which this is effected is not yet satisfactorily determined, a difference of opinion still existing as to whether it is caused by the action of a solvent, or by the mechanical operation of surface abrasion.

Some specimens do not attempt to excavate, but merely to enclose themselves in their own flask-like cases, to which occasionally foreign materials are added.

Species of this genus have been found in the Oolite Formations, and in the Older Tertiaries, but nowhere in any abundance.

1. GASTROCHÆNA DUBIA, *Pennant*. Tab. XXX, fig. 11, *a—d*.

MYA DUBIA. *Penn*. Brit. Zool., vol. iv, p. 82, pl. 44, fig. 19, 1777.
CHAMA PARVA. *Da Costa*. Brit. Conch., p. 234, 1778.
MYA PHOLADIA. *Mont*. Test. Brit., p. 28, 1803; and Supp., p. 20, 1808.
PHOLAS FABA. *Pulteney*. Hutchin's Hist. Dorset, p. 27.
GASTROCHÆNA MODIOLINA. *Lamk*. Hist. des An. s. Vert., tom. v, p. 447, 1818.
— — *Forb*. and *Hanl*. Hist. of Brit. Moll., p. 132, pl. 2, figs. 5—8, pl. F, fig. 5.
— PHOLADIA. *Turt*. Brit. Biv., p. 18, pl. 2, figs. 8, 9, 1822.
— — *Lukis*. Mag. Nat. Hist., vol. vi, p. 404, fig. 52, *a—g*.
— CUNEIFORMIS. *Phil*. En. Moll. Sic., vol. i, p. 2, 1836.
— POLII. *Id*. ,, ,, ,, vol. ii, p. 3, 1844.
— HIANS. *Flem*. Hist. Brit. An., p. 458, 1828.
— FULVA. *Leach*, MS. 1818. Ann. Mag. Nat. Hist., vol. xx, p. 272.
— DUBIA. *Desh*. Traité Elém. Conch., pl. 2, figs. 4, 5.
— POLIANA. *Phil*. In Wiegman Archiv. Nat., pl. 7, fig. 1, 1845.

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* Etym. γαστηρ, ventral, and χαινω, to gape.

GASTROCHÆNA FABA. "*Leach*, MS." 1817. Fide *Gray*.
MYTILUS AMBIGUUS. *Dillw.* Cat. of Recent Shells, p. 304, No. 9.
PHOLAS PUSILLA. *Poli.* Test. Sic., vol. i, p. 50, t. 8, figs. 12, 13, 1791.

Spec. Char. Testâ elongatâ, cuneiformi, tenui, fragili; hiatu magno ovato; striis incrementi valdè conspicuis; umbonibus subterminalibus vix prominulis; cardine subcalloso.

Shell elongate, wedge-shaped, thin and fragile, with a large ventral gape; lines of growth conspicuous; beaks nearly terminal, scarcely prominent; hinge with an obtuse callosity.

Length, $\frac{2}{3}$ inch.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton. Recent, Mediterranean, Britain.

Numerous fragments of the calcareous tube of this species are met with in the Red as well as in the Coralline Crag; and I have found the valves imbedded in the globular masses of coral so abundant in the latter Formation, and also in the thickest part of the common oyster. These excavations made by the animal appear all to have been lined with a calcareous coating, as well in the thick shell of the oyster as in the porous substance of the coral; and the exterior of this marsupium, or purse-like envelope, is always more or less granular, wherever it is exposed. My specimens present considerable variation in regard to magnitude, some of the valves having twice the length of others, though all appear to have formed a calcareous lining to their excavation, and as such, it is presumed, they have attained to full maturity. I have none so small as to be considered the young, without the lining, assuming it *not* to have the power of increase after it has once formed its own envelope.*

This calcareous flask-like covering is terminated posteriorly with a tube for the protection of the siphons, which project a little beyond the surface of the coral, and the neck of this is often of considerable thickness. At a distance of about a quarter, or sometimes half an inch within the tube, a calcareous partition is seen (fig. 11 *d*), with a linear opening crossed in two places, assuming the form of a double dagger, each siphonal aperture having the appearance of a cross. This opening appears to be variable in different species, but whether the form be a good specific distinction I am not able to say.

* In the case of the *Gastrochæna*, it is probable that only when it has attained to full maturity does it form a lining to its crypt, or a covering to itself; this being, as it were, exterior and detached from the vital portions of the animal, may be incapable of alteration, but it probably possesses the power of dissolving or destroying this case, and constructing another, as occasions require, by the same means it has employed for the enlargement of its domicile. The prevailing opinion is, that the shell, or exo-skeleton, as it is called, being extra-vascular, is not susceptible of alteration by interstitial increase, but we know that absorption does take place; and the examination of shell-structure by the microscopist shows us clearly its highly organized condition, permeated with vessels for the conveyance of fluids; and it is exceedingly difficult to explain in any other way some of the operations of the Mollusca, more especially the alterations in magnitude of the hinges of the Bivalves, for example, during the growth of the animal.

In some specimens, the terminal tube projects a little distance beyond the surface of the coral, and of course, when alive, has its siphons always free. Occasionally the coral has either grown faster than the mollusc, or, what is more probable, had continued to increase after the death of the imprisoned animal, the terminal opening having been closed up by the growth of the coral.

PHOLAS,* *Linnæus.*

DACTYLUS. *Pliny.*
HYPOGÆA HYPOGEODERMA. *Poli*, 1791.
ZIRFÆA. *Leach*, MS. 1817. *Gray*, 1851.
THOVANA. *Id.* 1818.
BARNIA. *Leach*, MS. 1819.
DACTYLINA. *Gray*, 1847.
ANCHOMASA. *Leach*, MS. 1819.

Generic Character. Shell ovate or transversely elongate, equivalved, inequilateral, externally rough or imbricated, more or less ornamented with radiating ridges, generally gaping at both extremities, occasionally furnished with accessory valves, and a reflected callosity over or before the beaks; a large, curved, testaceous appendage projects immediately beneath the umbo; no teeth or hinge ligament; and the impression of the mantle is deeply sinuated.

Animal thick and club-shaped; lobes of the mantle open in front, and reflected dorsally, by which the accessory valves are formed; siphonal tube long and extensile, divided at the extremity, and bordered with cirrhi; foot thick and truncated.

This is, generally speaking, a marine genus, and most of the species are inhabitants of shallow water, ranging to about 25 fathoms. *Ph. rivicola*, Reeves and Adams, 'Voyage of the Samarang,' pl. 25, fig. 5, is said to have been found burrowing in floating logs at Gunung Taboor, on the Pantai River, twelve miles from the sea, and where the water was quite fresh. This species is divided by a depressed line or sulcus, like *Ph. crispata*, and has, at the pedal opening, a calcareous covering, but without an accessory cup at the base of the siphons.

It is extremely difficult to define the generic limits of this group of shells. Some are furnished with an umbonal shield, consisting of several pieces; some have only a single dorsal valve, while in others this appendage is rudimentary or absent. These differences are considered to be only of specific value with many naturalists, while others make them generic distinctions.

The name given implies that the habits of these animals are those of excavators, and they are found to burrow in various materials, sandstone as well as calcareous rocks, wood, &c. The species do not always confine themselves to one kind for their habitations, and in all probability the mechanical mode is the one most generally

* Etym. φωλεω, to burrow, or hide in a hole.

employed; but whether the shell is the instrument used for such a purpose is not so satisfactorily determined. We sometimes find specimens with the asperities of the shell worn down, where the animal has located itself in mud; and at other times specimens have never had their roughened surfaces at all abraded. We know also that other animals than those belonging to the Mollusca, such as have no rough or hardened exterior, are able to penetrate deeply into stone as well as into wood.

1. PHOLAS CYLINDRICA, *J. Sowerby*. Tab. XXX, fig. 8, *a—d*.

PHOLAS CYLINDRICA. *J. Sow.* Min. Conch., t. 198.
— — *Nyst.* Coq. Foss. de Belg., p. 41, 1844.
Dale. Hist. and Antiq. of Harwich, p. 295, t. 13, fig. 6, 1730.

Spec. Char. Testâ elongatâ, subcylindricâ, tenui, fragili, valdè inæquilaterali; latere antico abbreviato, postico porrecto, accuminato; costatâ, costis anticis dentato-muricatis, costis posticis ad extremitatis evanescentibus.

Shell elongate, subcylindrical, thin, and fragile, very inequilateral; anterior side short, posterior prolonged, and obtusely pointed; costated; ribs on the anterior side toothed and rough, and on the posterior obsolete towards the extremity.

Length, 3 inches. *Height*, 1 inch, nearly.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton and Walton Naze.

This species is very abundant at Walton-on-the-Naze, but, from its fragility, specimens are difficult to obtain in perfect condition. In the Coralline Crag I have met with only a few fragments.

It most nearly resembles the British species, *P. parva*, from which it may, however, be distinguished by its being more inequilateral, the siphonal side occupying at least two thirds of the entire shell, and the opening for the foot on the ventral portion of the anterior side is larger and deeper. The shell is reflected over the back, covering the umbones, but the reflected portion is not partitioned like that of *Ph. dactylus*, and there is a tubercle at the middle, flattened by the pressure of the valves; the large and subovate impression of the adductor muscle is placed about midway between the umbo and the posterior extremity, and the line of the mantle-mark extends inwards a little beyond it; the plate or tooth curves from immediately beneath the beak, and is slightly spatulate in form. There is a small opening in the dorsal portion of the anterior side, which was no doubt covered by an accessory piece. Fragments of such a valve have been found by myself at Walton, most probably belonging to this species, (fig. 8, *d*.)

The figure given by Dale, above referred to, is no doubt our shell, as he says Dr. Woodward found it in Harwich Cliff; and as it is abundant at Walton Naze, its

proximity to that locality would fairly justify its being so considered, though he refers to Lister's figure, No. 276, which is *Ph. dactylus*, not as yet found in the Crag that I am aware of.

Pieces of indurated clay are occasionally met with at Walton Naze that have been perforated by this species; and I have a small portion, little more than two inches square, and half an inch thick, full of small specimens. These shells had effected an entrance from both sides, meeting in the middle; and one side contains almost as many as the other, showing the probability of the stone having been moved by the action of the water, to have permitted an ingress at both surfaces. A specimen of wood in my possession, from the Red Crag, but now in a lapideous state, contains an individual of this species, which, like *Ph. parva*, its very near relative, did not appear to confine itself to one kind of habitation. Some of these shells were at times only half immersed, as specimens have often the upper portion covered by the remains of a *membranipora*.

2. PHOLAS CRISPATA, *Linnæus*. Tab. XXX, fig. 9, *a—c*.

PHOLAS CRISPATA. *Linn.* Syst. Nat., p. 1111, No. 25, 1767.
— — *Penn.* Brit. Zool., 1st ed. p. 77, pl. 40, fig. 12, 1776.
— — *Don.* Brit. Shells, vol. ii, t. 62, 1801.
— — *Gould.* Inv. of Massach., p. 27, 1841.
— — *Dekay.* Hist. New York Moll., p. 247, pl. 32, figs. 506, and 506 *a*.
— — *Cuvier.* Règne Anim., pl. 113, fig. 3, animal.
— BISFRONS. *Da Costa.* Brit. Conch., p. 243, t. 16, fig. 4, 4.
— PARVA. *Id.* Brit. Conch., p. 247.
— — *Donovan.* Brit. Shells, vol. ii, pl. 69, 1801.
— LATUS. *List.* Hist. Conch., lib. iii, fig. 379 A, with the animal, 1685.
SOLEN CRISPUS. *Gmel.* Syst. Nat., p. 3228.
ZIRFÆA CRISPATA. *Gray.* List Brit. Moll., p. 53, 1851.

Spec. Char. Testâ ovatâ, crassâ, subæquilaterali, anticè breviore, rostratâ, et costatâ; costis dentato-muricatis, latere postico rotundato; extremitatis hiantissimis; sulco unico submediano, obliquo.

Shell ovate, thick, slightly inequilateral, anterior side the shorter, beaked and ribbed; ribs furnished with roughened and prominent denticulations; extremities widely gaping: divided by a submedial oblique suture.

Length, 3 inches. *Height*, 1½ inch.

Locality. Cor. Crag, Sutton.
Red Crag, Sutton, Walton Naze.
Mam. Crag, Bridlington. Fossil, Sweden.
Recent, Britain, Scandinavia, and N. E. Coast of America.

Although essentially a boreal species, it lived in the seas of the Coralline Crag, a

fragment of a specimen having been there found by myself. It seems to have become much more abundant in the succeeding Period, as it is by no means rare at Walton Naze, but difficult to procure, the shells generally separating at the suture. It has also been found in the Drift Beds in Ireland, and ranges, in the living state, on the N. E. Coast of America, as far as South Carolina. The characters of this species are well marked, so as not easily to be confounded with any other. It is found in a very modern Tertiary Deposit at Bracklesham, where specimens have been obtained measuring $4\frac{1}{2}$ inches in length, in company with *Ph. candida*.

Ph. dactylus is in Mr. Smith's 'List of Clyde Fossils.'

Pholadidea, *Leach*, 1819.

Pholas. *Turton.*
Martesia. *Leach*, 1818. *Blainv.* 1824.
Jouannetia? *Desmoul.* 1828.
Pholidea. *Swains.* 1835.

Generic Character. Shell ovate or oblong, equivalve, inequilateral, externally rough or imbricated. Anterior extremity open in the young, but closed in the adult shell. Posterior extremity truncated and gaping, furnished with a coriaceous or testaceous cup when full grown.

Animal club-shaped; mantle closed, except a small opening in front for the passage of a truncated, sucker-shaped foot. Siphonal tube long, terminating in a disk, surrounded with cirrhi; terminal openings also fringed.

This genus has been founded upon a species of one of the rock-boring molluscs, whose great peculiarity is, that when it has arrived at the full stage of existence, it closes the previously large opening in front with a thin calcareous covering; and at its posterior termination there is added a small testaceous cup at the base of the siphons. If this be entitled to generic distinction it must rest its claim upon the latter character, as many of the *Pholades* have a large pedal opening in their young state for the active employment of that organ, possessing the same habits as the animal of this genus, in closing the aperture when full grown by a calcified membrane. Some other species also endowed with this habit, though not strictly according with the diagnosis of this genus, appear to be very closely related, viz., *Pholadopsis*, Conrad, and *Triomphalia*, Sowerby, but the valves are of unequal magnitude. Other species, possessing two radiating furrows, have been proposed for a genus by Conrad, under the name *Parapholas*.

The prolongation of the shell at the posterior side appears to be the commencement of what, in proximate genera, become a lengthened calcareous tube for the protection of the elongated siphons, as pointed out by Messrs. Forbes and Hanley, when con-

sidering this as the connecting link between the *Pholas* and the *Teredo;* and it may be further remarked, that the habit of closing its anterior opening, when the animal has attained to full maturity, is very analogous to the closing of the anterior portion of the tube in the adult or senile species in the *Teredo* and other tube-forming Bivalves.

Pholades have been found fossil as early as the Lias, and, as it might be supposed, were present in the Tertiary Formations. One species, in the Paris Basin, forms a calcareous lining to its burrow.

PHOLADIDEA PAPYRACEA, *Solander.* Tab. XXX, fig. 10.

PHOLAS PAPYRACEA.	*Solander*, MSS., fide *Turton.*	Portland Cat., p. 82, lot 1828.
—	— *Turt.*	Brit. Biv., p. 2, pl. 1, figs. 1—4, 1822.
—	— *G. Sow.*	Gen. of Shells, No. 24, fig. 3.
—	— *Reeve.*	Conch. Syst., pl. 24, fig. 3.
PHOLADIDEA GOODALLII.		Dict. des Sc. Nat., t. 37, p. 532.
—	STRIATA. *Cuv.*	An. Kingd. (edit. Griffith), pl. 8, fig. 1.
—	LAMELLATA. *Turt.*	Brit. Biv., p. 4, pl. 1, figs. 5, 6.
—	LOSCOMBIANA. *Goodall*	in Turt. Conch. Dict., p. 147, 1819.
—	PAPYRACEA. *Forb.* and *Hanl.*	Brit. Moll., vol. i, p. 123, pl. 5, figs. 3—6.
—	— *Gray.*	List Brit. Moll., p. 52, 1851.

Spec. Char. "*P. testâ clavatâ, latere antico clauso obtusissimo, postico hiante truncato accessorio producto annulari.*"

"Shell club-shaped, closed and very obtuse at the anterior end, open and truncate at the other end, which is furnished with a produced accessorial ring."—*Turton.*

Length, 1½ inch. *Height,* ⅝ inch.

Locality. Cor. Crag, Sutton. Recent, South Coast of Britain.

A few fragments, in my cabinet, indicate so strong a resemblance to the recent British shell, that I do not hesitate to refer them to that species. One piece has the obtuse anterior extremity, with the smooth surface of the enclosed portion of the gape peculiar to the adult shell; while two fragments of the siphonal side are truncated, and marked with concentric lines like the recent species, without any radiating ridges. They are, however, unfit for description; and I have therefore copied the diagnosis from Turton.

TEREDO,* *Linnæus*, 1767.

TEREDO. *Sellius*, 1732. *Adamson*, 1757.	TEREDARIUS. *Dumeril*, 1806.
SIPHONIUM. *Brown*, 1756.	SEPTARIA. *Lamk.* 1818.
SERPULA (sp.) *Linn. Schröet.*	XYLOTRYA. *Leach*, MS. 1817.
UPEROTUS (sp.) *Guettard*, 1774.	BANKIA. *Gray*, 1840.
XYLOPHAGUS. *Gronov.* 1781.	MALLEOLUS. *Gray*, 1848.

* Etym. τερηδων, *Pliny*, a τερηω, to bore.

Generic Character. Shell convex, tumid, inequilateral, equivalved, presenting, with the valves united, an orbicular or nearly spherical outline, having a large angular opening in front, and a rounded or ovate aperture posteriorly; covered or ornamented externally with ridges or striæ, caused by the slightly reflected or thickened edges of the margin; a testaceous process or tooth, of a somewhat spatulate form, curves and projects inwardly from beneath the umbo; one distinct muscular impression; ligament obsolete.

Animal worm-shaped; mantle open in front; siphons very long, bifurcating at their extremities; orifices fringed; foot rudimentary.

The valves are situated at the anterior extremity of an irregular, subcylindrical, elongated, and somewhat flexuous testaceous tube, which appears to be formed for the purpose of lining the cavity made by the animal. This tube, in some species, is large, thick, and heavy, while in others it is thin and semi-transparent; the variation, perhaps, depending upon a necessary protection against lateral pressure. At the posterior termination are two pennate or palmate opercula, called *pallettes* by Adanson, or *calamules* by Deshayes, by which the aperture is closed at the will of the animal, one probably employed as a lid to each siphon; and this end of the tube, in some species, is partitioned with segments or semi-camerations, but for what especial purpose has not been satisfactorily ascertained. The growth of the animal, and necessarily the enlargement of the valves, causes a corresponding increase in the size of the tube, which is lengthened at the anterior extremity, while the posterior part is kept on a level with, or a little beyond, the surface of the wood, so as always to keep the siphons free.* The addition of calcareous matter is made to the larger end only, which is kept open until the animal has attained to full maturity, when it is closed with a convex or dome-shaped termination.

The habits of most of the species lead them to excavate timber of all kinds. *T. corniformis* burrows in the husks of the cocoa-nut; and *T. arenaria* locates itself in mud. The tube of the latter animal (figured and described by Mr. Griffiths, in the 'Phil. Trans.' for 1806, p. 269, from a specimen found on the N. W. Coast of Sumatra) measured 5 feet 4 inches in length, and 9 inches at its greatest circumference; the posterior termination was longitudinally divided into two separate tubes for about 8 or 9 inches, and the larger end was closed, where the animal had constructed two separate septa a few inches within. The character of a longitudinal division for the two siphons is sometimes observable in the European species of this genus, and they terminate divergingly; but this, probably, is not constant, and only dependent upon circumstances. The tube of *T. arenaria* presents, when fractured, a crystalline or radiating structure. The tubes of our fossil, and other European *Teredines*, are composed of numerous

* In the kindred genus *Xylophaga*, the animal does not furnish itself with a calcareous tube, as it never retreats far from the surface of the wood into which it has penetrated, consequently has no elongated siphons.

concentric layers, thickened with the age of the animal. *If* the Sumatra species correspond in all other respects with this genus, it will slightly diminish the value we have hitherto placed upon structural composition.

This genus is found abundantly imbedded in the fossil wood of the London Clay, and the fruits or seed-vessels of Sheppey (*Nipadites*, Bowerbank) are sometimes perforated by these animals. The tubes are of various sizes, some of them much smaller than others, the larger ends of which are generally closed, and consequently presumed to have attained to the full period of individual existence. The closing of the larger end is an operation performed also by other genera, such as *Clavagella* and *Aspergillum*, which have a perforated termination, and the valves are fixed or soldered into the sides of the tubes. This fixing of the valves is only done when the animal constructs the roof to its dwelling, as, if fixed at an earlier period, they would appear at irregular distances; and I believe the valves of these genera, like those of *Teredo*, are loose and free while the animals are growing, and only imbedded in the walls of the tubes at the time they have closed or imprisoned themselves by the construction of their dome-shaped or perforated disk.

There is no true ligament in this genus for the union of the valves, but a powerful muscle forms a deep impression upon the shell at the exterior of the dorsal margin, and is the only hinge on which the valves are moved.

A species has been found in the Lias in dichotyledonous wood.

The natural history of this "calamitas navium," as it was called by Linnæus, is graphically given by the authors of the 'Hist. of Brit. Moll.,' with the various opinions respecting these wood-eating animals, and their allies, the stone-eating *Pholades*. This subject is far from being exhausted, differences of opinion as to the modus operandi exist at the present day, and have done so ever since the time of Pliny, who imagined the animal of the *Teredo* to be a worm, and its two valves the formidable jaws by which it was capable of inflicting upon mankind such dire calamity. The species are not numerous, even in the recent state, but the individuals have multiplied to an alarming extent, and at one time threatened to submerge the States of Holland.

TEREDO NORVAGICA, *Spengler*. Tab. XXX, 12, *a—d*.

TEREDO NORVAGICUS. *Spengler*. Skrivt. af Naturh. selsk., vol. ii, part 1, p. 102, pl. 2, figs. 4—6 B, 1792.
— NORVAGICA. *Lovén*. Ind. Moll. Scand., p. 50, 1846.
— — *Forb*. and *Hanl*. Hist. Brit. Moll., vol. i, p. 67, pl. 1, figs. 1—5, 1848.
— NORVEGICA. *Thompson*. Ann. and Mag. Nat. Hist., vol. xx, pp. 157, 163.
— — *Adanson*. Acad. Scien. Par., t. 9, figs. 1—8.
— NAVALIS. *Mont*. Test. Brit., p. 527; and Supp., p. 7.

TEREDO NAVALIS. *G. Johnston.* Mag. Nat. Hist., vol. ii, p. 23, fig. 7, *b*, 1829.
— — *Dekay.* Nat. Hist. New York, p. 34, fig. 325.
— BRUGUIERI. *Delle. Chiaje.* Mem., vol. iv, pl. 54, figs. 9—12.
— — *Phil.* En. Moll. Sic., vol. i, p. 2; and vol. ii, p. 3.

Spec. Char. Testâ tumidâ, convexâ; angularibus striatis; utraque hiante, hiatu postico magno angulato; antico ovato.

Shell tumid, convex, subspherical; marked externally with angular striæ; gaping widely on both sides; posterior with a large angular opening; anterior ovate.

Diameter, $\frac{1}{2}$ inch.

Locality. Cor. Crag, Sutton, Ramsholt.

Red Crag, Sutton. Recent, Norway, North America, Britain, Mediterranean, and Black Sea.

A single valve, in my cabinet, is all that I have seen from the Crag, and this I believe to be *navalis* of Mont. Fig. 12, *c*, represents a fragment of the posterior portion of the tube, probably of this species, showing the camerated structure; but there is no appearance of longitudinal division. It is, however, too imperfect for any safe reliance in that respect.* Fragments of tubes are not unfrequently met with in the Red, as well as in the Coralline Crag, perhaps belonging to the same animal. They are thick and strong, with a diameter varying from $\frac{1}{8}$th to $\frac{1}{4}$th of an inch.

The valves of the different species of this genus preserve a great similarity, and it is said they can only be determined specifically by the pallets or styles at the posterior orifice, and as these have not, that I am aware of, been found in the Crag, the present appropriation, if the above be true, may be considered doubtful.

This portion of the Monograph contains the descriptions of forty-six species of Bivalves from the Lower or Coralline Crag Formation. Of this number, there are thirty-two identical with forms still in existence. From the Red Crag are described thirty-nine, out of which I have considered twenty-five as living species. Hence it will be seen that the former gives an amount of identification as high as 69 per cent., with a consequent extinction of 31; while the latter (Red Crag) has an amount of extinction as high as 36 per cent., giving, by this estimation, a greater antiquity to the higher or newer of the two Formations; and even presuming a better examination might bring the Red Crag on to an equality with the Coralline, the two Formations do not appear by this test to be capable of separation.

May it not be asked whether it is necessary, in order to ascertain the age of a Tertiary Formation by the per centage system, and to assign it to one of the tripartite or quadrupartite divisions of the Cainozoic series, we are to take the *whole* of the

* This part of the tube, according to Montague, affords little or no assistance in the determination of the species; the number of these camerations or partitions vary from four to as many as twenty; indeed, in one specimen he examined, he counted not less than twenty-nine.

Marine Fauna of the entire deposit, or may we be permitted to select a *part* only for such examination, and if so, what part?

The Mollusca herein described bear so close a resemblance to animals now living in our own seas, as to give good reason to believe their geological relationship to be *much* nearer to the present Period than to the Eocene; and if an amount of extinction of *more* than one half of its species be necessary to entitle a Deposit to be considered as belonging to what is called the Miocene or Middle Tertiary, our present identifications do not fulfil those required conditions, even for the lowest or oldest (by position) of the Crag Formations.

Assuming that a different construction might be put upon a few of the specific determinations, in opposition to the conclusions I have arrived at, I much doubt whether the Coralline Crag could possibly be made to contain more than 50 per cent. of extinct species of Mollusca; while the connection zoologically between this Deposit and those of the Eocene is so small as to have an identity of *less* than 1 per cent. that have transmitted their posterity *unaltered* from those Periods into the Crag; and although a considerable difference of conditions probably existed under which the Formations were deposited, Tropical forms are by no means wholly excluded from the Coralline Crag Sea, neither are sub-Arctic genera, such as *Glycimeris*, *Astarte*, and *Cyprina*, absent from the Older Tertiaries.

When the present work was begun, I had purposed to call it simply 'A Monograph of the Crag Mollusca;' but this title had to be submitted to the Council of the Palæontographical Society for their approval, when the term "Crag" was thought by some of the members of that body to be of too local or technical a significance, and would not be fully understood by foreign geologists; and the explanatory addition of 'Descriptions of Shells from the Middle and Upper Tertiaries of England' was then suggested, and acceded to by myself.

A more complete examination of these Deposits, during the progress of the work, has induced me to believe the term "Middle" to have been incorrectly introduced, there being no remains of a Formation in Great Britain referable to that Period, more especially if we are to depend, for such determination, upon the amount of extinction by the per centage mode of valuation; it is therefore requested to erase the words Middle and Miocene from the title-pages and other parts of the work formerly given, as I believe the Formations I have been here attempting to illustrate belong with more propriety to the Upper Tertiaries.

APPENDIX.

CEPHALOPODA.

Since the publication of the first part of this work, the Red Crag "diggings" have turned up portions and segments of *Nautilus* and *Ammonites*, but these, like the *Belemnites*, are derivative fossils, and may be traced to antecedent Formations; the Nautilus apparently to the London Clay, and the Ammonites to one of the middle Secondary Periods.* The Cephalopods living in our own seas, and even in those of more southern latitudes, like the Mediterranean, in association with a Marine Fauna similar to that of the Coralline Crag, are of such a perishable nature, and possess so little of preservable material, that, except under very favorable protection, should we be likely to find any portion of their remains. What are called the Tetrabranchiata, with strong calcareous shells, such as those from the Middle Tertiaries of Bordeaux and Dax, do not appear to have extended their existence into the sea of the Coralline Crag, although the *Pyrula* and *Pholadomya* (tropical forms), when first obtained in the Deposit of that Period, gave a slight hope that the *Nautilus* might also there be met with.†

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* In my cabinet are casts also of several species of Univalves and Bivalves, which, so far as such fossils will permit of an identification, are of shells belonging to the Older Tertiaries; and I will here mention that, although a few of the extraneous organic remains of the Red Crag may be traced to the Chalk and Older Secondaries, the great majority I believe to have been derived from the Eocene Deposits, and principally from the London Clay proper, along with the phosphatic nodules; and I would assign to the same source (the Older Tertiaries) the marine Vertebrata, *Carcharodon*, *Lamna*, *Myliobates*, *Pycnodus*, *Phyllodus*, *Edaphodon Pristis*, &c. &c., as well as the Cetacea, recently found in such abundance, and the Crustacea (*Zanthopsis*, &c.),—the abrasion, by coast action, being, in my opinion, sufficient to produce all the effects now visible in the Red Crag, with the sea of that period opening to the northward. Christchurch Bay, between Handfast Point and the Needles, may perhaps furnish us with a parallel.

† In the second part of the 'Eocene Mollusca,' by F. E. Edwards, Esq., is an address to the subscribers of the Palæontographical Society, respecting the Siphuncular Theory of the Cephalopoda. The author, when treating of the tube which perforates the chambers of the shells in that class of animals, attributed to myself the priority of pointing out a new explanation of the function of that organ, one which seems now to be generally admitted, and published in his own and better language the statement I had given him of my opinion, and the arguments used in support of it. This priority has, it seems, been laid claim to in the sentence quoted in that address. I have, until now, remained silent upon the subject, and would gladly have continued to do so, had not some of my friends expressed a desire that I should defend myself from what, to them, appears to be capable of being interpreted into an appropriation of the discovery of another as my own idea. The only defence that can now be offered is, that I was wholly unconscious of any other function than that of a hydrostatic balance having ever been attributed to this tube, and I confess to my having been unacquainted with the paragraph referred to.

The necessity of maintaining an integrity of character, and the preservation or permanence of adhesion in the inorganic elements in these Cephalopods, occurred to me from the especial study of *Bulimus decol-*

GASTEROPODA.

The following land and fresh-water shells are from the Formations belonging to the Uppermost or Newest Tertiaries of Great Britain. These shells are all, with the exception of four, undoubtedly identical with species still in existence in England, and it is thought an insertion of their names alone, with a reference to where they have been recently well figured and described, will be sufficient. The exceptions, though here extinct, are still existing in other parts of Europe; and as they were formerly inhabitants of where their remains are now found, they claim a place in the Monograph of the Upper Tertiaries of the British Isles.

I am indebted to Mr. John Brown, of Stanway, for the list of species from Copford and from Fisherton.

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latus and other decollated, or rather decapitated, shells, which appeared to have become so from the want of the necessary connection between the shell and the more vital parts. It is to Dr. Fleming, perhaps, that the real priority of the idea should be awarded. In his 'Philosophy of Zoology' there is a very significant passage, where he speaks of the *vitality* of the shell when in intimate contact with the fluids of the animal, foreshadowing there the belief, now generally entertained, that the calcareous portions of the Mollusca are far from being inert matter, secreted merely as protective coverings to the softer parts (a considerable section being wholly destitute of such coverings), but that they are truly constituent and integral portions of the animals themselves, only with a larger amount of inorganic elements.

It is well known that, in some of the extinct species of Cephalopods, the tube is protected throughout its entire length by a rigid, continuous, and inflexible covering, and one can scarcely refrain from an expression of astonishment that naturalists, who have purposely studied, and largely published their views upon the *Nautilus* and its congeners, should not have discerned the now presumed use of the siphuncle. If seen, it is perhaps still more extraordinary that this *silver cord* should have had with it so little explanation.

My friend Mr. Edwards has (I think wisely) left the determination of the claim to priority to the judgment of the members; but an ulterior question arises, which is, whether the paragraph quoted by Mr. Edwards in his address amounts to more than the suggestive passage by Dr. Fleming, similar in its purport, to which I have referred.

The two passages are here subjoined:—

"The shell cannot be considered as dead matter so long as it remains in connection with the living animal. In those animals in which the shell is external, there are muscles which connect the animal with its external surface, and the bond of union being a substance soluble in water, the muscles can be detached by maceration. The analogy between shell and bone is here obvious, although in the one case the connection between the muscle and the bone is permanent, in the other between the muscle and the shell temporary, or frequently changed during the life of the animal. But the *vitality* of the shell, if I may use the expression, is demonstrated from the changes which it undergoes when detached from the animal. The plates of animal matter harden, the epidermis dries, cracks, and falls off, and in many cases the colours fade or disappear. We confess ourselves unable to point out the means employed by the animal to prevent these changes from taking place by any process similar to circulation."—*Phil. of Zool.*, by Dr. Fleming, vol. ii, p. 405, 1822.

"Whatever additional advantage the existing Nautilus might derive by the continuation of a vascular, organized membranous siphon through the air-chambers, in relation to the maintenance of vital harmony between the soft and testaceous parts, such likewise must have been enjoyed by the numerous extinct species of the Tetrabranchiate Cephalopods, which, like the Nautilus, were lodged in chambered and siphoniferous shells."—*Lectures upon the Invertebrata*, by Professor Owen, p. 331, 1843.

Mr. Pickering has furnished me with those from Grays and the Kennet Valley; Mr. Woodward has supplied the Maidstone one; and the Cropthorn list was published by the late Mr. Strickland. The species from Clacton and Stutton were obtained by myself, and for which I am responsible.

Land or fresh-water shells have also been found at Bacton (*a*), Brentford, Cambridge (*b*), Casewick, Charing (*b*), Chislet, Clapton, Cuxton (*b*), near Stroud, Erith, Faversham, Folkestone, West Hackney, Harwich, Hemingford Abbots, Herne Bay, Ilford, Isle of Wight, Littleport (*b*), (Isle of Ely), Market Weighton, Mundesley, Peterborough, Rain near Braintree, Runton, Stamford, Valley of the Nar (*b*), Witham, and Yeovil; perhaps elsewhere, but the localities are too numerous to have here a separate and distinctive catalogue.(*c*) These Lacustrine or Fluviatile Beds appear to be principally confined to the middle and southern portions of England; and although they may, perhaps, exist in Scotland or in Ireland, I have been unable to procure, for insertion here, the name of any locality that might be considered as analogous or synchronous with the older of these deposits. The fresh-water fossils that have come under my observation from either of those kingdoms, or from the Isle of Man, were found in peat bogs.

By the following table it will be seen that the species of fresh-water shells fall short of those which live exclusively on land, although the individuals of the former generally outnumber those of the latter, as we see amongst the same group of Mollusca of the present day. In the Uppermost Tertiaries we have about fifty-five species of land shells, with about forty-four fresh-water ones. In the latter are included eleven species of Bivalves, and the amphibious Succinea. Our catalogues of the land and fresh-water Mollusca existing in England enumerate about seventy-two of the former, with fifty-one of the latter, giving a slight difference in the proportions between the recent and fossil species; but the excess in number at the present day is greater than can be made up by the extinct species of these deposits, showing that, if we really have obtained *all* the species belonging to those past periods, the incomers exceed those which have here gone out of existence, giving a considerable increase to the existing Fauna, making the insular condition of England better tenanted than when it is supposed to have formed a part of the Continent.

(*a*) Bacton is considered by Mr. Prestwich (from position) to be the oldest of all these fresh-water deposits; it is most probably synchronous with the Marine and Estuary Beds of Chillesford and Bramerton. I much regret my list of Mollusca from this locality is so insignificant as to be unworthy of a separate insertion. Chislet, Ilford, and Mundesley contain one or more of the extinct species, and these may be assigned to the age of Stutton, Grays, &c.

(*b*) These are probably the most modern.

(*c*) The uppermost Tertiaries, or those above the Crag in these islands, have, with every degree of probability, been separated into four distinct Geological Periods, and our able coadjutor, Mr. Prestwich, has, I believe, come to the conclusion that an addition must even be made to this number. Their separation has, however, been founded exclusively upon geological evidence; and it is with the hope that palæontological aid may afford some slight assistance to their correct determination that I have made a separate enumeration of the contents of several of our most important fresh-water localities. Existing species certainly extend through all, but they are not equally disseminated.

The want of permanence presented by the more recent Formations in the duration of the specific existence of their Fauna, compared with those of more ancient Deposits, is probably owing to the greater variety and more rapid alterations of the conditions under which the organisms have their existence in recent epochs than in those more remote.

No. of Species.	PULMONATA.		Stutton.	Clacton.	Grays.	Cropthorn.	Copford.	Fisherton.	Maidstone.	Newbury.
	Arion ater, *Müller, vide* F. & H. Hist. Brit. Moll.,†	vol. iv, p. 7, pl. DDD, fig. 4	..	..	..	..	..	..	*	..
	Limax agrestis, *Id.* ,,	vol. iv, p. 13, pl. DDD, fig. 2	*	..	*	..	*	..	*	*
	— Sowerbyi, *Ferrussac* ,,	vol. iv, p. 22, pl. EEE, fig. 3	..	..	*	..	*	..	*	*
	Helix aspersa, *Müller* ,,	vol. iv, p. 44, pl. 116, fig. 1	..	..	..	..	..	..	..	*
5	— nemoralis, *Linnæus* ,,	vol. iv, p. 53, pl. 115, figs. 1-4	*	*	*	..	*	..	*	*
	— — *var.* hortensis, *Mül.* ,,	. . . . .	*	..	..	..	*	..	..	*
	— arbustorum (*a*), *Linnæus* ,,	vol. iv, p. 48, pl. 115, figs. 5, 6	*	..	*	..	*	*	..	*
	— fruticum, *Müller, vide* p. 308	. . . . .	*	..	..	..	..	..	..	..
	— Cantiana (*b*), *Montague, v.* Ht. Brit. Moll.,	vol. iv, p. 50, pl. 116, figs. 8, 9	..	..	..	..	..	..	..	..
	— ericetorum (*c*), *Müller* ,,	vol. iv, p. 61, pl. 117, fig. 4	..	..	..	..	..	..	..	..
10	— rufescens, *Pennant* ,,	vol. iv, p. 66, pl. 118, figs. 4, 7, 10	..	..	..	..	*	*	..	*
	— sericea, *Draparnaud* ,,	vol. iv, p. 71, pl. 118, figs. 5, 6	..	..	..	..	*	*	..	*
	— hispida (*d*), *Linnæus* ,,	vol. iv, p. 68, pl. 118, figs. 1-3	*	*	*	..	*	*	*	*
	— — *var.* plebeia, *Jeffreys* ,,	. . . . .	*	*	*	..	*	*	*	..
	— — *var.* concinna, *Id.* ,,	. . . . .	*	*	*	..	*	..	..	*
	— — *var.* depilata, *Alder* ,,	. . . . .	..	..	..	..	*	..	..	..
	— incarnata? *Müller, vide* p. 309	. . . . .	..	..	..	..	*	..	..	..
	— virgata, *Da Costa, v.* Hist. Brit. Moll.,	vol. iv, p. 57, pl. 117, fig. 10	..	*	..	*	..	..	..	*
15	— lapicida, *Linnæus* ,,	vol. iv, p. 65, pl. 116, figs. 3, 4	..	*	..	..	*	..	..	..
	— lamellata, *Jeffreys* ,,	vol. iv, p. 73, pl. 117, figs. 8, 9	..	..	..	..	*	..	..	..
	— pulchella, *Müller* ,,	vol. iv, p. 78, pl. 119, figs. 8-10	*	*	*	*	*	*	*	*
	— — *var.* costata, *Id.* ,,	. . . . .	..	..	..	..	*	..	..	..
	— aculeata, *Id.* ,,	vol. iv, p. 74, pl. 117, figs. 5, 6	..	*	..	..	*	..	..	..
	— fulva, *Id.* ,,	vol. iv, p. 75, pl. 118, figs. 8, 9	*	*	..	..	*	*	*	*
20	— ruderata, *Studer, vide* p. 309	. . . . .	..	*	*	..	*	..	..	..
	— rotundata, *Müller, v.* Hist. Brit. Moll.,	vol. iv, p. 80, pl. 119, figs. 6, 7	..	*	*	..	*	..	*	*
	— fusca, *Montague* ,,	vol. iv, p. 77, pl. 119, figs. 4, 5	..	..	..	..	*	..	..	..
	— cellaria, *Müller* ,,	vol. iv, p. 33, pl. 120, figs. 1-3	..	*	..	..	*	..	*	..
	— alliaria, *Id.* ,,	vol. iv, p. 34, pl. 120, figs. 5, 6	..	..	..	..	*	..	..	*
25	— nitidula, *Draparnaud* ,,	vol. iv, p. 36, pl. 120, figs. 8-10	*	..	*	..	*	..	*	*
	— radiatula, *Alder* ,,	vol. iv, p. 38, pl. 121, fig. 1	..	*	*	..	*	*	*	*
	— nitida, *Müller* ,,	vol. iv, p. 39, pl. 120, figs. 4, 7	..	*	..	..	..	..	..	..
	— pura, *Alder* ,,	vol. iv, p. 37, pl. 121, figs. 5, 6	..	*	..	..	*	..	..	..
	— pygmæa, *Draparnaud* ,,	vol. iv, p. 83, pl. 121, figs. 9, 10	..	..	*	..	*	*	..	..
30	— crystallina, *Müller* ,,	vol. iv, p. 41, pl. 122, figs. 1, 2	..	*	..	..	*	..	*	*
	— excavata, *Bean* ,,	vol. iv, p. 40, pl. 121, figs. 2-4	..	*	..	..	..	..	..	..
	Succinea putris, *Linnæus* ,,	vol. iv, p. 132, pl. 131, figs. 1-5	*	*	*	*	*	*	*	*
	— — *var.* Pfiefferi, *Rossm.* ,,	. . . . .	*	..	..	*	*	..	..	*
33	— oblonga, *Draparnaud* ,,	vol. iv, p. 137, pl. 131, figs. 6, 7	..	*	..	..	..	..	*	..

† The references in this list are made to the 'History of British Mollusca,' by Messrs. Forbes and Hanley, except where otherwise particularly expressed.

(*a*) Tab. XXXI, fig. 22, is the representation of a monstrous form of this species. A small fracture, in infancy, has caused the angle of volution to be slightly altered, by which the shell became elongated. At the upper corner of the aperture on the body whorl is a small tooth or calcareous deposit, forming a sort of excurrent canal, an accidental character produced probably by its abnormal form, as I have never seen the like in any existing specimen. This was found at Cherry Hinton by the Rev. Osmond Fisher, in what appears, he says, the site of an old moor or fen. With it were several other shells, *H. ericetorum*, *Limnæa*, *Planorbis*, *Succinea*, &c. From the same locality Mr. Fisher kindly forwarded to me, with the above, the fragment of *Cardium edule*. He says, "I suppose this to have been brought by a sea-gull, or to have accidentally been dropped on the spot by some extraneous means." This fragment does not look as if it belonged to a recent specimen, and I am inclined to believe it to be a genuine fossil of the locality. Estuary or tidal conditions might have prevailed over the Bedford Level as high as Cambridge, by the sinking of the eastern coast only a *few feet*, such as we may fairly assume to have been the case when the Inland Cliff at Lowestoff, for example, was washed by the sea; and although the deposits at Littleport and Cherry Hinton are probably very modern, the introduction here of these shells as fossils is upon the assumption that they belong to an ante-human period.

(*b*) This is in a list of Pleistocene shells in my possession as from Faversham, but upon whose authority I do not now know.

(*c*) From Cherry Hinton and Bostol.

(*d*) *H. conoidea*, Sowerby, figured in the 'Mag. Nat. Hist.,' vol. vii, p. 429. pl. 2, figs. 4, 5, to accompany Mr. Brown's Paper on the Clacton Fossils. I have not been able to see this specimen; but, judging from the figure, it does not appear to be anything more than a variety of *H. hispida*. This species, when frequenting marshy places, does assume an elevated form.

The asterisks denote the presence of the species.

No. of Species.	PULMONATA.	Stutton.	Clacton.	Grays.	Cropthorn.	Copford.	Fisherton.	Maidstone.	Newbury.
	Bulimus Lockhamensis(*a*), *Mont.*, *v.* Ht. Bt. Moll., vol. iv, p. 89, pl. 127, fig. 6	..	*	..	..	..	..	..	..
	— acutus(*b*), *Müller* ,, vol. iv, p. 86, pl. 128, fig. 5	..	..	..	..	*	..	..	..
	— obscurus(*c*), *Id.* ,, vol. iv, p. 90, pl. 128, fig. 7	..	..	..	..	*	..	..	..
	— lubricus, *Id.* ,, vol. iv. p. 125, pl. 125, fig. 8	*	*	*	..	*	*	..	*
	— tridens, *Pulteney* ,, vol. iv, p. 128, pl. 125, fig. 9	*	*	..	..	*	..	..	..
	Achatina acicula(*d*), *Müller* ,, vol. iv, p. 130, pl. 128, fig. 4	..	..	*	..	*	..	..	..
40	Pupa umbilicata, *Draparnaud* ,, vol. iv, p. 95, pl. 129, fig. 7	..	*	..	..	*	..	..	..
	— anglica *Ferussac* ,, vol. iv, p. 99, pl. 129, fig. 6	..	..	..	..	*	..	..	..
	— muscorum, *Linnæus* ,, vol. iv, p. 97, pl. 129, figs. 8, 9	*	*	*	*	*	*	*	*
	— edentula, *Draparnaud* ,, vol. iv, p. 103, pl. 130, fig. 1	..	..	..	..	*	*	..	..
	— minutissima, *Hartmann* ,, vol. iv, p. 104, pl. 130, fig. 2	..	*	..	..	*	..	..	..
45	— pygmæa, *Draparnaud* ,, vol. iv, p. 106, pl. 130, figs. 4-6	*	*	..	*	..	..	..	..
	— — *Id. var.* alpestris ,, ...	..	..	..	..	*	..	..	*
	— sexdentatus, *Montague* ,, vol. iv, p. 108, pl. 130, fig. 3	..	..	*	..	*	..	..	..
	— pusilla, *Muller* ,, vol. iv, p. 111, pl. 130, fig. 8	..	*	*	..	*	..	..	..
	— antivertigo, *Draparnaud* ,, vol. iv, p. 109, pl. 130, fig. 7	*	*	*	..	*	..	..	..
	— angustior, *Jeffreys* ,, vol. iv, p. 112, pl. 130, fig. 9	..	..	..	..	*	..	..	..
50	Balea fragilis(*e*), *Linnæus* ,, vol. iv, p. 114, pl. 128, figs. 8, 9	..	..	*	..	..	..	*	..
	Clausilia biplicata, *Montague* ,, vol. iv, p. 118, pl. 129, fig. 4	..	*	*	..	..	..	..	..
	— bidens, *Müller* ,, vol. iv, p. 116, pl. 128, fig. 10	..	..	..	..	*	..	..	..
	— nigricans, *Mat.* and *Rack.* ,, vol. iv, p. 121, pl. 129, figs. 1, 2	..	..	..	..	*	..	..	..
	— plicatula, *Draparnaud* ,, vol. iv, p. 120, pl. 129, fig. 3	..	..	..	..	*	..	..	..
55	Carychium minimum, *Müller* ,, vol. iv, p. 198, pl. 125, fig. 6	*	*	*	*	*	*	*	*
	Conovulus denticulatus(*f*), *Montague* ,, vol. iv, p. 194, pl. 125, fig. 3	..	..	..	..	..	..	..	..
	Limnæa stagnalis(*g*), *Linnæus* ,, vol. iv, p. 174, pl. 124, figs. 4, 5	..	*?	*	..	*?	..	..	*
	— auricularia, *Id.* ,, vol. iv, p. 169, pl. 123, figs. 1, 2	*	*	*	*	..	*	..	*
	— peregra, *Müller* ,, vol. iv, p. 165, pl. 123, figs. 3-7	*	*	*	*	*	*	..	*
60	— palustris, *Linnæus* ,, vol. iv, p. 180, pl. 124, fig. 2	*	*	..	*	*	*	..	*
	— truncatulus, *Müller* ,, vol. iv, p. 177, pl. 124, fig. 3	*	*	*	*	*	*	*	*
	— glaber(*h*), *Id.* ,, vol. iv, p. 178, pl. 124, fig. 1	..	..	..	..	..	..	..	..
	— glutinosa(*i*), *Id.* ,, vol. iv, p. 182, pl. 124, figs. 6, 7	..	..	..	..	..	..	..	..
	Ancylus fluviatilis, *Id.* ,, vol. iv, p. 186, pl. 122, fig. 4	*	*	*	*	..	*	..	*
65	— lacustris, *Id.* ,, vol. iv, p. 188, pl. 122, fig. 5	*	*	*	*	..	..	..	*
	Physa fontinalis(*k*), *Linnæus* ,, vol. iv, p. 140, pl. 122, fig. 9	..	*?	..	..	..	..	..	*
	— hypnorum, *Id.* ,, vol. iv, p. 143, pl. 122, figs. 6, 7	..	..	..	..	*	..	..	..
	Planorbis corneus, *Id.* ,, vol. iv, p. 147, pl. 126, figs. 4, 5	*	*	*	*	..	..	..	*
	— spirorbis, *Id.* ,, vol. iv, p. 159, pl. 127, figs. 9, 10	*	*	*	*	*	..	..	*
70	— vortex, *Id.* ,, vol. iv, p. 157, pl. 127, figs. 6-8	*	*	..	*	*	..	..	*
	— contortus, *Id.* ,, vol. iv, p. 160, pl. 126, fig. 3	*	*	*	*	*	..	..	*
	— albus, *Müller* ,, vol. iv, p. 149, pl. 126, figs. 1, 2	*	*	*	*	*	..	..	*
73	— glaber(*l*), *Jeffreys* ,, vol. iv, p. 150, pl. 126, figs. 8, 9	*	*	*	*	..	..	..	..

(*a*) A fragment of what appears to be this species is in my cabinet, and the name is also in Mr. Trimmer's Paper on the Orton Gravel.—*Quart. Journ. Geol. Soc.*, vol. x, p. 346.

(*b*) A fragment, on the authority of Mr. Pickering.

(*c*) In Mr. Brown's List.

(*d*) Professor Morris, in his 'Catalogue,' gives this from Clacton. May not the burrowing habits of the living animal have introduced it amongst the fossils? I have frequently found dead specimens when examining the Cor. Crag sand.

(*e*) I have been unable to obtain any satisfactory evidence of the fossil state of this species. An imperfect *Clausilia* much resembles it, and may possibly have been mistaken as such.

(*f*) From the Valley of the Nar. (*C. B. Rose.*)

(*g*) My cabinet contains only a fragment, from Clacton, of what may be this species.

(*h*) This is given with a ?, in Mr. Prestwich's Paper, *Quart. Journ. Geol. Soc.*, vol. xi, p. 110, *loc.* Shacklewell Lane. It is mentioned also in Mr. Trimmer's Paper on the Orton Gravel, *loc. cit. ante.*

(*i*) From Sir Charles Lyell's Paper on the Mundesley Fresh-water Beds.—*Phil. Mag.*, vol. xvi, p. 365.

(*k*) The fragment of a *Physa*, from Clacton, is in my cabinet, but not perfect enough to determine the species.

(*l*) *Pl. lævis* is mentioned in Sir Charles Lyell's Paper from Mundesley. I presume it is this species.

No. of Species.	PULMONATA.	Stutton.	Clacton.	Grays.	Cropthorn.	Copford.	Fisherton.	Maidstone.	Newbury.
	Planorbis nautileus, *Linnæus*, *v.* Hist. Brit. Moll., vol. iv, p. 152, pl. 126, figs. 6, 7	*	*	*	*	..	..	..	*
75	— nitidus, *Müller* ,, vol. iv, p. 161, pl. 127, figs. 11, 12	*	*	*	..	*	..	..	*
	— marginatus, *Draparnaud* ,, vol. iv, p. 155, pl. 127, figs. 1-3	*	*	*	*	*	..	..	*
	— carinatus, *Müller* ,, vol. iv, p. 152, pl. 127, figs. 4, 5	..	*	..	..	..	..	..	..
	— lacustris, *Lightfoot* ,, vol. iv, p. 162, pl. 128, figs. 1-3	..	*	..	..	..	..	..	..
	Cyclostoma elegans(*a*), *Müller* ,, vol. iv, p. 201, pl. 122, fig. 3 .	..	..	..	..	..	..	*	..
80	Acicula lineata, *Draparnaud* ,, vol. iv, p. 204, pl. 125, fig. 7 .	..	..	..	..	*	*	..	..
	— — *Id.* *var.* perversa ,, ...	..	..	..	..	*	..	..	..
	PECTINIBRANCHIATA.								
	Neritina fluviatilis, *Linnæus*, *v.* Hist. Brit. Moll., vol. iii, p. 3, pl. 71, figs. 1, 2 .	..	..	..	..	..	..	..	*
	Paludina vivipara(*b*), *Id.* ,, vol. iii, p. 11, pl. 71, figs. 14, 15	..	..	..	..	..	..	..	..
	— marginata, *Michaud*, *vide* p. 320	*	*	*	*	..	..	..	..
	Bithinia tentaculata, *Linnæus*, *v.* Hist. Brit. Moll., vol. iii, p. 14, pl. 71, figs. 5, 6 .	*	*	*	*	*	..	..	*
85	— ventricosa, *Gray* ,, vol. iii, p. 16, pl. 71, figs. 7, 8 .	..	..	..	..	*	..	..	*
	Rissoa Thermalis? *Linnæus*, *vide* p. 319	..	*	..	..	..	..	..	..
	Valvata piscinalis, *Müller*, *v.* Hist. Brit. Moll., vol. iii, p. 19, pl. 71, figs. 9, 10	*	*	*	*	*	*	..	*
	— — *Id.* *var.* antiqua, *Morris* ,, ...	..	*	*	..	..	..	..	..
88	— cristata, *Müller* ,, vol. iii, p. 21, pl. 71, figs. 11-13	*	*	*	..	*	..	..	*

(*a*) Specimens of this species, with *H. ericetorum* and other *land* shells, are found at Bostol, near Woolwich, in a deposit of several feet in thickness (8—10), probably a talus from the chalk. A similar bed, containing numerous species of land shells, is mentioned as resting upon the Greensand at Gore Cliff. (*Bowerbank*, 'Proc. Geol, Soc.', vol. ii, p. 449.) I have met with this species (*C. elegans*) in like situations over the Crag, though I have never seen it in a living state in the eastern part of Suffolk. Mr. Woodward gives it from the Caves of Torquay.

(*b*) This is given in Sir Charles Lyell's Paper on the Mundesley and Runton Beds, *loc. cit. ante*.

HELIX FRUTICUM, *Müller*. Tab. XXXI, fig. 19, *a*, *b*.

HELIX FRUTICUM. *Müll.* Verm. Terr. et Fluv. Hist., p. 71, No. 267, 1773.
— — *Schröter*. Erdconch., p. 178, t. 2, fig. 19, Nos. 55—59, 1771.
— — *Chemn.* Conch. Cab., vol. ix, p. 150, t. 133, fig. 1203, 1786.
— — *Drap.* Hist. Nat. des Moll. Ter. de la France, p. 83, No. 10, pl. 5, figs. 16, 17, 1805.
— — *Brard.* Hist. des Moll., p. 58, No. 14, pl. 2, fig. 13, 1815.
— — *Pfieff.* Deutsch Land und Sussw. Moll., p. 23, No. 3, pl. 2, figs. 3—5, 1821.
— — *Rössmasl.* Icon. der Lund. und Sussw. Moll., p. 61, pl. 1, fig. 8.
— CINEREA. *Poiret.* Prodr., p. 73, No. 8. Fide *Deshayes*.
— TERRESTRIS? *Gmel.* ex *Drap.*

Spec. Char. "*Testâ orbiculato-convexa, umbilicatâ, tenui, pellucidâ, obsoletè-striatâ, albidâ; spirâ subprominulâ, labro margine reflexo.*"

Shell roundedly convex, umbilicate, thin, pellucid, obsoletely striated, white; spire slightly prominent; outer lip reflexed.

Diameter, $\frac{3}{4}$ inch.

Locality. Fossil, Stutton.

Recent, Denmark, France dans la Bresse (Depart. de l'Aisne), Saléve near Geneva (*Jeffreys*).

One specimen only of this species, obtained by myself, is all that I have seen. It appears to be full grown, though its sharp and reflexed outer lip is destroyed, but in all its other characters it perfectly resembles the recent shell.

HELIX INCARNATA? *Müller.* Tab. XXXI, fig. 17, *a*, *b*.

HELIX INCARNATA.	*Müll.*	Loc. cit., p. 62, No. 259, 1773.
— —	*Drap.*	Loc. cit., p. 100, No. 29, pl. 6, fig. 30, 1805.
— —	*Pfieffer.*	Deutsch Land und Sussw. Moll., p. 33, pl. 2, fig. 15, 1821.
— —	*Rossm.*	Loc. cit., p. 35, t. 26, fig. 361.
— —	*Desh.*	Exped. de Morée, p. 160, No. 231.
— —	*Brown.*	Geol. Journ., vol. viii, p. 190, fig. 4, *a*—*c*, 1852.

Spec. Char. "*Testâ subglobosâ, depressiusculâ, perforatâ, pellucidâ, corneâ; spirâ prominulâ; labro margine rufescente, subreflexo.*"

"Shell subglobosa, slightly depressed, perforated (umbilicated), pellucid, and corneous; spire slightly prominent; margin of lip reflexed and reddish."

Diameter, ½ inch.

Locality. Fossil, Copford. Recent, France, and Belmont near Lausanne.

Two or three specimens only of what most probably belonged to this species are all that I have seen. They were obtained at Copford by Mr. John Brown, who has obligingly permitted me to have them described; they are unfortunately not in a very good state of preservation. The best specimen appears to correspond with the recent shell; but not being full grown, it has only five volutions instead of six, and is evidently an immature individual, consequently wants the reflexed lip, the character of maturity. It differs from *rufescens*, which is more depressed; and from *hispida* in having a smaller umbilicus; and our fossil is more globose than either. The identification is not, however, perfectly satisfactory, and it would be desirable to see a few more and better specimens.

HELIX RUDERATA, *Studer.* Tab. XXXI, fig. 15, *a*, *b*.

HELIX RUDERATA.	*Stud.*	Systemat. Verz. der Schweiz. Conch. s. 86, 1820.
— —	*Hartman.*	Erd. et Sussw. Moll., No. 57, t. 11, fig. 11, 1821.
— —	*Pfieff.*	Deutsch Land und Sussw. Moll., p. 31, t. 4, fig. 26, 1824 ?
— —	*Rossm.*	Icon. Land and Sussw. Moll., p. 13, t. 32, fig. 455.
— —	*Brown.*	Geol. Journ., vol. viii, p. 190, fig. 4, *d*, *e*, 1852.
— ROTUNDATA, var. β.	*Nils.*	Hist. Moll. Suec. Terr. et Fluv., s. 31, 1822.

Spec. Char. "*Testâ perspectivè-umbilicatâ, depressâ, lutescentè-cornea, concolor, subtilissimè costulato-striatâ, spirâ convexâ, anfractibus* 4—5 *subteretibus; aperturâ ovali; peristomate recto, simplici, acuto.*" —Rössmasler.

"Shell perspectively umbilicated, depressed, of a clouded or dirty-horn colour, very finely striated by elevated lines of growth; spire convex, volutions 4—5, tapering; aperture ovate; peristome plain, simple, sharp."

Diameter, ¼ inch.

Locality. Fossil, Clacton, Grays, Copford.

Recent, Sweden, Finland, Russia, Styria, Switzerland, and Cincinnati, U. S.

This is not very rare at Clacton; at Copford, Mr. Brown tells me, it is so. It closely resembles *H. rotundata* in its large umbilicus and elevated ridges, but is justly separated from that species by well-marked characters, having large volutions, which are fewer in number, and the aperture is consequently more open. *H. striatella*, Anthony, 'Bost. Journ. Nat. Hist.,' vol. iii, p. 278, pl. 3, fig. 2, an existing species in the United States, is now admitted to be the same as the above; and *H. perspectiva* is, perhaps, only a variety. A species, with a geographical range extending from Russia and Switzerland to Massachusets and Ohio, might be expected to possess considerable variation.* In my List of Land and Fresh-water Shells from the Older Tertiaries, at Hordwell, published in the 'Lond. Geol. Journ.,' vol. i, p. 118, I had considered a species found there to have prolonged its existence *unchanged* to the present time, and that the one above referred to (*striatella*) was its specific descendant. Mr. F. Edwards, in his 'Monograph of the Eocene Moll. Pulmonata,' p. 66, gives his opinion adverse to that decision; and I am now inclined to think he is correct. *H. labyrinthica* was given in my list as one of the species existing at the present time, while two others were also inserted there, but with a doubt. I was at one time impressed with the idea that an air-breathing mollusc, being less exposed to a variation of conditions, was enabled to preserve a specific existence longer than its marine brethren; and I fear it gave a slight bias to my determinations. Mr. Edwards has bestowed upon the *labyrinthica* a very critical and a very able examination, and has pointed out some differences between the Hordwell fossil and the existing American shell; but they were not, he considered, sufficient to invalidate their identity, more especially as the living shell is itself subject to considerable variation; assuming, also, that if we possessed a large series of fossil specimens, these differences would probably disappear: is it really certain that the possession of a larger series must necessarily bring the recent and fossil nearer together? This species of mollusc appears to stand almost, if not entirely, by itself, as dating its existence from the Older Tertiaries; and, as we are obliged to depend exclusively upon the restricted characters of the shell alone, we are compelled to admit its identity, from the impossibility of pointing out a dissimilarity such as is generally considered sufficient for specific separation. Might it not be possible that the combined characters of the entire animal, could they be possessed, would exhibit a difference so as to prevent its coming within the definition of a species in the present acceptation of that term? If this Hordwell fossil be really still an existing shell, it militates somewhat against the hypothesis that a species with a very prolonged existence in regard to time, would, if still in being, have a more extended geographical range, and *vice versa*; it does not appear so in regard to *Helix*, when *labyrinthica* is compared with *ruderata*.

SIPHONOSTOMATA.

MITRA EBENUS, *Lamarck*. Tab. XXXI, fig. 7.

MITRA EBENUS. *Lam.* Ann. du Mus., vol. xvii, p. 216, No. 58, 1822.
— — *Phil.* En. Moll. Sic., vol. i, p. 229, t. 12, figs. 8—10.
— — *Bellardi.* Monog. delle Mitre Foss. del Piedmonti, p. 23, t. 11, figs. 20—23, 1850.
— PYRAMIDELLA. *Bronn.* var. β. Ind. Palæonth., p. 733, 1848.
— PLUMBEA. *Lamk.* Hist. des An. s. Vert., tom. vii, No. 73, 1822.

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* This is the only one of the six extinct species belonging to these Fluviatile deposits that has its range to the westward; the others belong to the European Continent, with the exception of *Cyrena consobrina*, now an inhabitant of the Nile. The Mollusca of these beds do not appear to have any connection with the peculiar, and probably more recent, Faunas of the Canaries, Madeiras, or the Azores.

MITRA LÆVIS? *Dubois.* Wolhyn. Pod., t. 1, figs. 2, 3. Fide *Phil.*
— DEFRANCII. *Payr.* Cat. Moll. Cors., p. 166, t. 8, fig. 22.
— CORNICULA. *Sismond.* Syn. Meth. an. Invert. Ped. Foss., p. 41.
VOLUTA PLICATULA. *Brocchi.* pp. 318 and 646, t. 4, fig. 7.
— CORNICULA. *Linn.* Syst. Nat., ed. 11, p. 1191.

Spec. Char. Testâ turritâ, sublævigatâ, aut obsoletè costatâ; anfractibus convexiusculis; aperturâ spiram æquante; columellâ triplicatâ sive quadruplicatâ.

Shell turreted, nearly smooth, with obsolete ribs; whorls slightly convex; aperture the length of the spire; columella with three or perhaps four folds.

Length. ¾ inch.

Locality. Cor. Crag, Gedgrave. Recent, Mediterranean. Fossil, Apulia and Piedmont.

A single specimen of this genus has been obligingly presented to me by Mr. Charlesworth, and this is the only one I have seen. It is not quite perfect, the outer lip being slightly broken, but it is otherwise in good condition; and there is every reasonable probability of its belonging to one of the variable forms of *ebenus*. It most resembles the variety with the upper volutions somewhat obscurely costated, having the body one smooth. My specimen has seven volutions, and three distinct folds upon the columella; the upper two folds large and distant, the third smaller and closer, with a very minute one lower down, perhaps invisible if the lip were perfect. There is a slightly depressed mark around the upper part of the volution, and, in the living state, probably corresponded with Philippi's description, "infra suturas linea *albida* obscurè cinctis."

A specimen of *Mitra* is mentioned, in the 'Mem. of the Geol. Survey,' vol. i, p. 429, as having been found in the Glacial Beds of Wexford, and referred to *M. cornea*, Lamk., with doubt.

MITRA PLICIFERA. *S. Wood.* Crag Moll., vol. i, p. 21, t. XXXI, fig. 8.

Not having been able to obtain anything more perfect than what have been so long in my cabinet, I have had my best specimen figured, in order to call attention to its existence in the Coralline Crag. It appears too strongly costated to be a variety of *ebenus*, and the apex is more obtuse than in that species. It must, therefore, remain for the present with its provisional name.

PYRULA ACCLINIS, *S. Wood.* Tab. XXXI, fig. 6, *a*, *b*.

PYRULA RETICULATA, *Lam., vide.* Crag Moll., vol. i, p. 42, t. 2, fig. 12.

A better knowledge of the various recent shells of this genus give reason to believe the differences previously pointed out between the fossil and the recent species, to which it was assigned, are sufficient to entitle it to specific distinction; I therefore propose for the Crag shell the above name.

Edward Acton, Esq., of Grundisburgh, has, out of his rich collection, presented me with a cast in sandstone of what most probably was this species, obtained from the Red Crag of Sutton, which appears to present a still greater difference from the recent *reticulata* than do either of my own specimens, from which the assignment had previously been made. This cast (fig. 6, *a*) shows a greater elevation of spire than either the recent shell or my own fossils, which might perhaps be expected; but the excess in height is more than would arise simply from its being a cast, and it shows also more particularly that the shell from which it was taken had a shorter canal than the true *reticulata*: the latter character is, I think, sufficient to separate our fossil from the existing species, and I am the more readily induced on that account to change the name previously given.

This is in a sandstone nodule, similar to what has been spoken of at p. 69, and the cavity left by the withdrawal of the shell is imperfectly filled by carbonate of lime in a crystallized state, the crystals

being deposited upon the internal cast; while upon the matrix is exhibited the sculpture of the exterior on which also are deposited similar crystals. Besides the present species, Mr. Acton has kindly given me a specimen of *Nassa conglobata* in the same state; and although the last has not yet been found in the Coralline Crag, I think there is every reason to believe the cast of this species, as well as the other sandstone nodules previously noticed, are the littoral remains of a destroyed portion of what might have been a purely sandy deposit of the age of the Older Crag.

TROPHON NORVEGICUM, *Chemnitz*. Tab. XXXI, fig. 1, *a*, *b*.

STROMBUS NORVEGICUS. *Chemn.* Conch. Cab., vol. x, p. 218, t. 157, figs. 1497, 1498, 1788.
FUSUS NORWEGICUS. *Turt.* Mag. Nat. Hist., vol. vii, p. 351, 1834.
— NORVEGICUS. *Howse.* Ann. and Mag. Nat. Hist., vol. xix, p. 162, pl. 10, figs. 1—4, 1847.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. iii, p. 428, pl. 107 and 108, fig. 7.
TRITONIUM NORVEGICUM. *Midd.* Malaco. Rossica., part 2, p. 147.
— — *Lovén.* Ind. Moll. Scand., p. 11, 1846.

Spec. Char. "*T. oblongâ, subulatâ, albâ, anfractibus sex teretibus; aperturâ patulâ ovatâ, caudâ subadscendente, fauce eburneâ.*"—Chemnitz.

"Shell smooth, volutions six, rather flat, the lower one ventricose; aperture twice the length of the rest of the shell, and pure white; outer lip much dilated, and smooth on the inner margin; the edge sharp and slightly reflected; pillar smooth."

Length of recent shell, 4½ inches.

Locality. Red Crag, Sutton and Felixstow. Recent, British and Arctic Seas.

A few fragments, or the young state of this species, have been for some time in my cabinet, but their very imperfect condition rendered an assignment doubtful; and until the discovery of the larger specimen, which was obtained at Felixstow by Mrs. Henry Bartlet, of Ipswich, who has obligingly entrusted it to my care for examination and representation, I was fearful to introduce the name into the List of British Fossils; but there is now very good reason to believe the above-named species was an inhabitant of our seas during the period the Red Crag was deposited. Mrs. Bartlet's specimen (fig. 1, *a*) consists of a considerable portion of the shell, with the outer lip and anterior canal destroyed: what remains corresponds so closely with the existing species, that there is every probability of its identity. Our shell is thin, has lost its outer coating, and the suture in consequence is deepened; upon the shell are still visible numerous, but somewhat obsolete striæ. The fracture of the specimen appears to have been produced or accelerated by the inroads of a Cliona —a means of destruction not uncommon with the shells of the Crag. Being unable to give a detailed description, I have taken the diagnosis from Chemnitz; he refers to 'Seba Thesaur,' vol. iii, t. 52, fig. 9? 1758, who was probably the first to notice the species. It is said to have been found in the Newer Tertiaries of Sweden.

Mr. Howse states having dredged the living shell, in sixty fathoms water, off the Durham coast.

TROPHON TURTONI, *Bean*. Tab. XXXI, fig. 2.

FUSUS TURTONI. *Bean.* Mag. Nat. Hist., vol. vii, p. 493, fig. 61.
— — *Howse.* Ann. Nat. Hist., vol. xix, p. 163, pl. 10, figs. 6—10.
— — *Reeve.* Conch. Icon. Fusus, vol. iv, pl. 20, fig. 83.
— — *Forbes* and *Hanley.* Hist. Brit. Moll., vol. ii, p. 431, pl. 105, figs. 3, 4, and pl. 106, figs. 2—4.

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Spec. Char. "*Testâ ovato-turritâ, crassiusculâ; spirâ enormiter acuminato-productâ, apice papillari; anfractibus spiraliter striatis, supernè concavis, vix angulatis; aperturâ amplâ, labro incrassato subreflexo; albida.*"—Reeves.

"Shell ovately turreted, somewhat thick; spire enormously produced, with a mammillated apex; whorls spirally striated, concave on the upper part, scarcely angulated; aperture large, with a thickened, slightly reflexed outer lip."

Length (of the recent shell), 5 inches.

Locality. Red Crag, Ramsholt. Recent, British Seas.

The fragment of a shell in my cabinet corresponds with the young or spiral portion of the above-named recent species, and this is all that I have seen; it is thin and fragile, having lost its outer coating, and is quite smooth, and it is placed provisionally in this position.

TROPHON PROPINQUUM? *Alder.* Tab. XXXI, fig. 3, *a*, *b*.

FUSUS PROPINQUUS. *Alder.* Catal. Moll. Northum. and Durh., p. 63.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. iii, p. 419, pl. 103, fig. 2.
— SABINI. *Forbes.* Mem. Geol. Surv. Grt. Brit., vol. i, p. 426.

The British conchologists appear to consider they have well-defined characters for the separation of *T. Islandicum* and *T. propinquum*, the former having a mammillated apex, while in the latter the volution is commenced from a much smaller point; the pullus of each being sufficient to determine the species. In addition to which the *propinquum* is said to be comparatively much shorter and more tumid, or less elongated than the other. My Coralline Crag specimens appear to preserve a sort of intermediate character, and I have thought it necessary to give an enlarged representation of the spire of our shell, which is certainly not mammillated, and corresponds in its elongated and elegant form with *T. Islandicum*, having eight volutions, with a length of one inch and a quarter, and its greatest diameter $\frac{7}{16}$ths of an inch: thus appearing to unite the distinguishing characters of the two recent species. The specimens from the Red Crag are tolerably abundant, but the apex—the character by which it is said to be distinguished—is generally more or less injured. It has been found at Bridlington, and in the Drift in Ireland.

TROPHON FABRICII, *Beck.* Tab. XXXI, fig. 4.

TROPHON FABRICII. (*Beck*) ex *Möller.* Ind. Moll. Groenl., p. 14, 1842.
TRITONIUM CRATICULUM. *Fabricius.* Faun. Groenl. Fide *Möller.*
FUSUS FABRICII. *Forbes.* Mem. Geol. Surv., vol. i, p. 425.

Spec. Char. Testâ ovato-turritâ, vel ventricoso fusiformi; costatâ, costis acutis, angulatis; transversim striatâ, striis prominulis remotis; aperturâ ovatâ; labro incrassato, intus lævi; caudâ brevi; columellâ planâ.

Shell ovately turreted, or ventricosely fusiform; costated, ribs sharp and angulated; transversely striated, striæ slightly prominent and remote; aperture ovate; outer lip thickened, smooth within; canal short; columella plain.

Length, $\frac{5}{8}$ inch.

Locality. Drift Beds, Wexford (*Forbes*). Recent, Greenland.

"This beautiful species, which was not observed in the Drift Beds until found in Ireland by Captain (Major) James, is intermediate in its character between *Fusus scalariformis* and *Fusus Barvicensis*. It has the general form and ventricose whorls of the former, with the fimbriated ribs of the latter."—*Forbes.*

The figure is from the only specimen that I have seen. It is in the Museum in Jermyn Street.

Fusus Forbesi. *Strickland.*

"According to Mr. G. B. Sowerby, identical with *Fusus cinereus*, Say, an American species, synonymous with *Buccinum plicosum* of Menke."—*Forbes*, 'Mem. Geol. Surv.,' vol. i, p. 426.

Locality. Isle of Man.

"Fusus Barvicensis. *Johnston.*

"*Locality.* *Fossil*, Irish Drift.
Living, Northern Coasts of Britain."

"Fusus Bamffius. *Donovan.*

"*Locality.* *Fossil*, one of the most generally diffused and abundant species in the British and Irish Glacial Beds.
Living, Northern and Arctic Regions of the European Seas, common on the Scottish Coasts, Greenland, Seas of Boreal America."—*Forbes*, 'Mem. Geol. Surv.,' vol. i, p. 425.

"Fusus curtus. *Smith.* MS. Tert. Dep. of the Basin of the Clyde, Trans. Geol. Soc., 2d ser., vol. vi, p. 156, No. 26.

"*F. Testâ oblongâ, crassiusculâ, lævigatâ, spiraliter striatâ; anfractibus subrotundatis quinque, ultimo majori; aperturâ oblongâ, magnâ; canali brevissimo obtuso.* Long. 0·3, lat. 0·12, poll."

"This species has the form of many *Pleurotomata*, particularly of *Pl. filosa*, but it has not the notch near the posterior part of the outer lip which characterises that genus. I have, therefore, found it necessary to place it with the *Fusi*; the very short, scarcely evident canal, however, tends to separate it from the more typical species of *Fusus*."

The above description of the Clyde Beds fossil has been obligingly forwarded to me by Mr. Smith, of Jordan Hill; it was drawn up by the late Mr. G. B. Sowerby. From what I can learn of this shell, which I have not been able to see, it probably belonged to *Pl. reticulata*, Brown. *Pl. Trevellianum*, Turt. *Mangelia Trevelliana*, Forbes and Hanley.

"Fusus nov. sp.? or variety of F. crispus, *Brocchi* (?).

"A shell measuring above an inch in length, fusiform, the whorls narrow, and crossed by prominent ribs, which are traversed by raised spiral ridges. The characters are those of *F. crispus*, of which it is probable an extreme form; but more perfect specimens are required for accurate determination. It is very distinct from any recorded Drift fossil.

"*Locality.* *Fossil*, Wexford.*
Living, *F. crispus* is at present a Mediterranean species.

"It occurs fossil in the Sub-Apennine beds."—*Forbes*, 'Mem. Geol. Surv.,' vol. i, p. 426.

There is a specimen from the Red Crag in my cabinet, which resembles this species; but it is in a worn and mutilated condition, and undeterminable. *F. crispus* is figured by Michalotti, 'Desc. des Terr. Mioc. de l'Ital. Septen.,' p. 272, No. 3, pl. 9, figs. 17, 18, who refers to *Borson*, 'Oritt. Piemont,' p. 317.

It is not mentioned by Brocchi.

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* Every possible assistance has been most obligingly rendered to me by the officers of the Geological Survey, in their endeavours to discover this and some other Fossils, but all their exertions have been unsuccessful. Not anticipating the calamity that has deprived us of our lamented associate and friend, the late Professor E. Forbes, I did not think it necessary to apply to him respecting these species until I began to work upon the Appendix, knowing his ever-ready willingness to assist whenever occasion might require. My application has been thus unfortunately delayed, which I should the more regret were it not that his authority for the existence and correct determination of these species is quite sufficient without any endorsement I could give them.

NASSA PYGMÆA, *Lamarck.* Tab. XXXI, fig. 5.

RANELLA PYGMÆA. *Lamk.* Hist. des An. sans Vert., 2d ed., vol. ix, p. 550, No. 14.
— — *Kiener.* Coq. viv. (*Ranel*), p. 33, pl. 10, fig. 2.
TRITONIA VARICOSA. *Turt.* Zool. Journ., No. 7, p. 365, t. 13, fig. 7.
NASSA INCRASSATA, var. *Flemg.* Brit. An., p. 340, 1828.
— PYGMÆA. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. iii, p. 394, pl. 108, figs. 5, 6.

Spec. Char. Testâ turritâ, costatâ et spiraliter striatâ, costis numerosis, striis creberrimis decussantibus; sæpe varicibus in anfractibus superioribus; aperturâ ovatâ, labro extus incrassato, varicoso.

Shell turreted, costated, and spirally striated, ribs numerous, with close-set striæ; upper volutions often bearing thickened ribs or varices; aperture ovate; outer lip thickened externally.

Length, ½ inch.

Locality. Cor. Crag, Sutton. Recent, Britain.

A single specimen, but not in good condition, is in my cabinet, and appears to correspond with what the British conchologists have confidently proposed as a distinct species. I believe the Crag fossil to be identical with the living shell.

I have withheld a notice of this, as well as a few other imperfect specimens from the Crag, up to the present time, in the hope of being able to procure something better to represent than what I am now only able to give.

NASSA MONENSIS, *Forbes*, MS.

NASSA MONENSIS. *Strickland.* Proc. Geol. Soc., vol. iv, p. 8.

In the first volume of my Monograph, p. 31, t. 3, fig. 5, a Red Crag shell was considered to have belonged to the above species, and it was inserted as such upon the authority of the late Professor E. Forbes. Mr. Smith has recently sent me a MS. note, accompanied with a sketch, by the original discoverer, of what is there called *N. Monensis.* "*Nassa* differing from *N. macula* in having the spire less produced, the body whorl much more ventricose, and the longitudinal ribs fewer. It appears intermediate between *N. macula* and *N. ambigua.*" Forbes. The figure presents some considerable differences from the Crag shell, and I regret my inability to obtain a sight of the Manx specimen; they must, therefore, remain united for the present.

NASSA PLIOCENA. *Strickland.* Proc. Geol. Soc., vol. iv, p. 9.

Locality. Isle of Man.

This shell I have been unable to obtain a sight of.

Nassa reticulata is enumerated in Mr. Smith's 'List of the Clyde Fossils,' 'Proc. Geol. Soc.,' vol. iv, p. 9.

"BUCCINUM CILIATUM. *Fabricius.*

"Syn. (a variety.) *Buccinum Humphreysianum*, Bennett. Possibly, *Buc. fusiforme*, of Broderip, may be an extreme form of this species.

"*Locality.* *Fossil*, North of England and Scotland.
Living, very rare in the British Seas, common in Arctic Seas and on the Banks of Newfoundland."—*Forbes*, 'Mem. Geol. Surv.,' vol. i, p. 427.

This is another recorded British Tertiary fossil that I have been unable to obtain a sight of.

CANCELLARIA SCALAROÏDES, *S. Wood.* Tab. XXXI, fig. 9.

CANCELLARIA CORONATA. *S. Wood.* Crag. Moll., part 1, p. 64.

I have here introduced the figure of a specimen from the Coralline Crag, at Sudbourne, given to me by Mr. Charlesworth, since the publication of my first part, and as it presents a variation in character from those previously in my possession from the Red Crag, it is desirable it should be represented. From this more especially, and from a further examination of the other specimens, I am induced now to believe the Crag shell to be distinct, and to be intermediate between *C. varicosa,* Broc., and *C. coronata,* Scacchi. In this Coralline Crag specimen the costæ are very few, not more than seven in the last volution, like those of *varicosa,* but the upper part is more angular than in that species, and it differs from *coronata* in not only having fewer costæ, but the outer lip of our shell is furnished with numerous ridges or teeth, about ten, apparently at all ages; and there are three distinct folds upon the columella, the upper one small, the middle one the largest; while in *varicosa* the upper one is the large one. The form of the aperture is also different from what is represented by Philippi in the figure he has given of *C. coronata.* The form of our shell approaches that of *Fusus,* the proportions of the aperture being little more than one third of its entire length: although these dimensions may vary in several specimens, and is a character of no very great importance, but, united with other differences, give reason to believe our shell to be entitled to an isolated position. The Red Crag shell is probably the prolonged existence of the Coralline Crag species.

LACUNA VINCTA, *Montague.* Tab. XXXI, fig. 13, *a, b.*

TURBO VINCTUS. *Mont.* Test. Brit., vol. ii, p. 307, pl. 20, fig. 3, 1803.
LACUNA VINCTA. *Turt.* Zool. Journ., vol. iii, p. 192.
— — *Gould.* Inv. Massach., p. 262, fig. 178 *.
— CANALIS. *Turt.* Zool. Journ., vol. iii, p. 192.
— QUADRIFASCIATA. *Id.* Zool. Journ., vol. iii, p. 191.
— — *Lovén.* Ind. Moll. Scand., p. 22.
— DIVARICATA. *Id* Ind. Moll. Scand., p. 23.
— PERTUSA. *Conrad.* Journ. Acad. Nat. Sci. Philadelph., vol. vi, p. 266, pl. 11, fig. 19.
PHASIANELLA BIFASCIATA. *Brown.* Illust. Brit. Conch., pl. 46, fig. 47, 1827.

Spec. Char. Testâ ovato-conoideâ, tenui; anfractibus convexiusculis, rotundatis; labro tenui, simplici; columellâ latè angustâ, excavatâ, arcuatâ.

Shell ovately conical and thin, with about four slightly convex or rounded volutions; outer lip thin and simple; columella elongated, curved, and excavated.

Length, ⅛ inch.

Locality. Mam. Crag, near Norwich.

Clyde Beds. Recent, Britain, Norway, and North America.

The shell, in the living state, to which my fossil is assigned as an identity, indulges in such considerable variation, that I have placed it there as its most probable position, and the longitudinal proportions between the varieties called *gracilis* and *quadrifasciata* would give a mean with which our fossil appears to correspond, approaching, however, rather nearer to the latter (like the fig. 169, *Gould*); but the three specimens in my possession are not in good preservation, and have lost the greater portion of the outer coating, by which the form is altered. One specimen presents a somewhat square outline to the aperture, resembling, in that character, *L. crassior.* The recent shells of this genus have

greatly perplexed the conchologist, and the condition of my fossils presents greater difficulties in their determination.

In the 'Memoirs of the Geological Survey,' vol. i, p. 423, *Lacuna Montacuti* is quoted as having been found in the Drift Beds of Ireland.

Littorina? suboperta, 'Crag Moll.,' vol. i, p. 118, t. 10, fig. 13. Since the figure here referred to was made, I have obtained a rather better specimen, which shows a flattened or slightly concave columella, the characteristic distinction of the genus *Lacuna*. It may, perhaps, with more propriety be called *Lacuna suboperta*.

Littorina neritoides, rudis, and *palliata,* are enumerated in the 'List of Clyde Fossils.'

FOSSARUS SULCATUS, *S. Wood.*

PHASIANEMA SULCATA. *S. Wood.* Catalogue, 1840. *loc. cit.*
FOSSARUS CLATHRATUS. *Id.* Crag Moll., vol. i, p. 121.

The Crag shell was considered by myself as an id entity with the Mediterranean species, which subsequent examination gives reason to believe is not correct; I have, therefore, ventured to restore to it the provisional name given in my 'Catalogue.' It resembles a recent British shell which I believe belongs to this genus, *Odostomia dolioliformis*, 'Hist. Brit. Moll.,' vol. ii, p. 301, pl. 97, fig. 5. Our fossil is, however, specifically distinct, and seems to preserve an intermediate character between *dolioliformis* and *clathratus*, being larger than the one, and smaller than the other, and more elongated than either. The ridge upon the columella is at times invisible, and is a character not to be depended upon.

ODOSTOMIA UNIDENTATA, *Montague.* Tab. XXXI, fig. 11.

TURBO UNIDENTATUS. *Mont.* Test. Brit., p. 324, 1803.
VOLUTA UNIDENTATA. *Mat.* and *Rack.* Trans. Lin. Soc., vol. viii, p. 121.
JAMINIA UNIDENTATA. *Brown.* Illust. Brit. Conch., pl. 50, figs. 34, 35, 1827.
ODOSTOMIA UNIDENTATA. *Forb.* and *Hanl.* Hist. Brit. Moll., vol. iii, p. 264, pl. 95, figs. 7, 8.
— PLICATA. *Flem.* Brit. An., p. 310, 1828.

Spec. Char. Testâ minutâ, ovato-conoideâ, lævigatâ, anfractibus 5—6 *convexiusculis, spirâ paulo longiore, aperture ovatâ, labro simplici, columellâ unidentatâ.*

Shell small, ovately conical, smooth, with about five or six volutions, slightly convex; spire a little longer than the aperture, which is ovate, with a simple lip; columella toothed.

Length, $\frac{1}{16}$ inch.

Locality. Red Crag, Walton Naze. Recent, Britain.

A solitary specimen of a shell of this perplexing genus has been recently obtained by myself from the Red Crag, and it appears to accord best with the shorter variety of the above-named recent British species, although it differs slightly in having the volutions at the base rather more rounded.

In the former part of my Monograph, *Od. plicata* and *Od. conoidea* are united as one and the same species, which I now believe to be distinct, as pointed out by the authors of the 'Hist. of Brit. Mollusca.' Both these species were in existence during the Crag Periods, the latter in the Coralline, and the former in the Red Crag.

A shell in my cabinet, from the Coralline Crag, strongly resembles *Od. eulimoides;* but the specimen is not in sufficiently good preservation for figure or description.

ODOSTOMIA TRUNCATULA? *Jeffreys.* Tab. XXXI, fig. 16.

ODOSTOMIA TRUNCATULA. *Jeff.* Ann. Nat. Hist., new ser., 1850, p. 150.
— — *Forb.* and *Hanl.* Hist. Brit. Moll., vol. iii, p. 294, pl. 96, fig. 8, 1850.

Spec. Char. Testâ elongato-turritâ, subulatâ vel subcylindraceâ, lævigatâ, pellucidâ? tenui; anfractibus 5—6 convexiusculis; aperturâ ovatâ, labro acuto; umbilico parvo; columellâ obsoletè unidentatâ.

Shell elongately turreted, tapering, or nearly cylindrical, smooth, thin, and transparent? volutions 5—6, somewhat flattened; aperture ovate; outer lip sharp; columella with an obsolete tooth, and small umbilicus.

Length, $\frac{1}{4}$ inch.

Locality. Cor. Crag, Sutton. Recent, Britain.

Three or four specimens in my possession appear to correspond with the recent shell above referred to. In comparing my fossils with some specimens of the recent shell, obligingly presented to me by Mr. Barlee, the greatest difference appears to be in the apex, which, in the living shell, is somewhat flatter and more obtuse than in my fossil, whose apex is blunt or obtuse, but not flat, neither does it appear to have been reversed. My specimens unfortunately are not in the best state of preservation.

Assiminea Grayiana is enumerated as a fossil by Mr. Dixon, in his 'List of Shells from the Upper Tertiaries of Bracklesham.'

RISSOA SOLUTA, *Philippi.* Tab. XXXI, fig. 10.

RISSOA SOLUTA. *Phil.* En. Moll. Sic., vol. ii, p. 130, pl. 23, fig. 18, 1844.
— — ? *Jeffreys.* Ann. Nat. Hist., vol. xx, p. 16.
— — ? *Forb.* and *Hanl.* Hist. Brit. Moll., vol. iii, p. 131, pl. 75, figs. 3, 4, 1850.

Spec. Char. Testâ minimâ, elongato-turritâ, lævigatâ, anfractibus (quatuor vel quinque) rotundato-ventricosis, suturis profundis; aperturâ suborbiculari.

Shell minute, elongately turreted, smooth; whorls (four or five) roundedly ventricose, sutures deep; aperture nearly orbicular.

Length, $\frac{1}{16}$ inch.

Locality. Cor. Crag, Sutton. Recent, Mediterranean.

I have found, in the Sutton sand, a single specimen of a shell which corresponds closely with the figure and description by Philippi, above referred to.

Messrs. Forbes and Hanley, p. 131, supra, have expressed great doubt respecting the existence of Philippi's species, and they have appropriated his name to the British shell. I fully participate in their doubt respecting the identity of the Mediterranean form with that found in our own seas; but, judging from the fossil now figured, I am much inclined to believe the Mediterranean shell to be a valid species; and in the event of its being hereafter so determined, I would suggest the name of *intersecta* for the recent British shell, as in that case *soluta* must be retained for the one to which it was first given.

The Crag shell may be more particularly described as being somewhat thin, and now opaque, though perhaps transparent in the living state; quite smooth, without appearing to have lost its outer coating; although somewhat elongate in the spire (differing therein from the recent British shell), the apex is obtuse, with at least four volutions, and a deep suture, particularly the last (but not "disjoined"), and with a distinct and deep umbilicus. The outer lip is simple, not thickened by a ridge, neither is it toothed within; the aperture somewhat rounded, but the diameter of the opening is rather greater in a longitudinal direction, and is about two fifths the entire length of the shell, with the lower part slightly effuse.

RISSOA THERMALIS? *Linnæus.* Tab. XXXI, fig. 12, *a*, *b*.

TURBO THERMALIS. *Linn.* Syst. Nat., 12th ed., p. 1237, No. 629.
— MURIATICUS? *Beudant.* Ann. du Mus., tom. xv, p. 201.

Spec. Char. "*T. umbilicatâ oblongiusculâ, obtusâ, anfractibus teretibus lævibus.*"—Linnæus.

Shell elongately conical or subulate, naked, smooth, and glossy; volutions six, slightly convex; suture distinct and deep; apex obtuse, depressed; aperture ovate; inner lip adpressed, giving a pointed termination at the upper part; umbilicus small.

Length, $\frac{1}{4}$ inch. *Diameter*, $\frac{2}{5}$ of the length.

Locality. Clacton.

It is now most difficult, perhaps impossible, to say what Linnæus intended for the type of his *Turbo Thermalis*, as there are two or three species that might, with a moderate allowance of latitude in variation, be made to accord with the diagnosis of his shell, and, it is to be feared, have already been done so. I am unwilling to make "confusion worse confounded," so have introduced our shell with the above name instead of imposing a new one, though not without great misgivings upon the propriety of doing so, particularly as Linnæus, in his description, says, "T. semine Brassicæ paulo major."

Our fossil is by no means rare at Clacton, but the majority of my specimens were obtained from the clay or estuary portion of the deposit at that locality in association with marine or rather estuary species: *Cardium edule*, *Tellina Balthica*, *Trigonella plana*, *Mytilus edulis*, and *Balanus*. I have also found specimens in the sandy and purely fresh-water part of the cliff, with land and fresh-water shells, so that probably its animal inhabitant was capable of residing in water that was either fresh or brackish. Mr. John Pickering has presented me with some specimens of a recent shell identical with our fossil, and these, he tells me, were obtained in the ditches of brackish water near Gravesend, in Kent. Similar specimens were pronounced by Messrs. Forbes and Hanley, vol. iv, p. 267, to be only varieties of *R. ventrosa*, in which opinion I cannot coincide; and I am permitted by Mr. Pickering to say he believes the two shells to be specifically distinct.

This shell, or something very like it, was found by MM. Ehrenberg and Von Hemprich, "in fontibus Oasis Jovis Hammonis inter Alexandriam et Rosettam."

JEFFREYSIA? PATULA, *S. Wood.* Tab. XXXI, fig. 14, *a*, *b*.

NATICA DEPRESSULA. *S. Wood.* Catal. of Crag Shells, Ann. and Mag. Nat. Hist., 1840, p. 530.

Spec. Char. Testâ minutâ, subglobosâ, lævigatâ, politâ, tenui, vitreâ, pellucidâ? umbilicatâ; apice obtuso; anfractibus paucis 1—2 *depressis; suturis profundis, excavatis; aperturâ magnâ, ovatâ, dilatatâ; labro simplici acuto.*

Shell small, subglobose, smooth, glossy, thin, vitreous, pellucid? umbilicated; apex obtuse; volutions few, 1—2, depressed; suture deeply excavated; aperture large, ovate, expanded; outer lip thin and sharp.

Diameter, $\frac{1}{10}$ inch.

Locality. Cor. Crag, Sutton.

Three specimens of a small species were found by myself many years since, and reserved to the present time. They are now assigned provisionally to the above genus, more from the difficulty of finding a better position than from a satisfaction of their correct appropriation. They appear to differ from *Natica*, where

they were first placed, in having an obtuse instead of an acute apex, like all the species in that genus that I have examined, and the texture of the shell is vitreous and clear, and when living was probably quite transparent. The form much resembles that of *Natica*, but the peristome is continuous, and not impressed by the body whorl, nor is the inner lip spread out as in the species of that genus. I know of nothing strictly resembling it, and if the determination of the genus depend, as it is said, entirely upon the form of the operculum, it will probably be long ere it is correctly determined by that character.

PALUDINA PARILIS, *S. Wood.*

PALUDINA LENTA. *S. Wood.* Crag. Moll., vol. i, p. 110.

Since the publication of my first volume, wherein I had assigned the Crag shell as an identity with the fossil from the Older Tertiaries, and considered them both as the progenitors of a shell now living in the Nile, I have given to them a more extended examination, with an increased number of specimens, and have reason to believe they are all three distinct.

I therefore propose the above name for the British Upper Tertiary Fossil, in lieu of the one it has hitherto borne.

PALUDINA MARGINATA, *Michaud.* Tab. XXXI, fig. 18, *a, b.*

PALUDINA MARGINATA. *Mich.* Comple. de l'Hist. Nat. des Coq. Terr. et Fluv. de la France, p. 98, No. 11, t. 15, figs. 58, 59, 1831.
— — *Lyell.* Man. Elem. Geol., p. 127, fig. 112, 1851.
— MINUTA. *Strickland.* Silur. Syst., p. 555.
— — *Lyell.* On the Boulder Formations and F. W. Deposits of Eastn. Norf., Phil. Mag., ser. 3, vol. xvi, No. 104, p. 354, fig. 4, 1840.

Spec. Char. "*Testâ minimâ, pellucidâ ovatâ, nitidâ, albidâ, longitudinaliter substriatâ; anfractibus quinis, rotundatis; aperturâ ovato-rotundatâ; labro extus marginato; apice obtuso, papillato. Operculum ignotum.*"—Michaud.

Shell small, pellucid, ovate, naked, white, slightly striated longitudinally; volutions five, rounded; aperture roundedly ovate; outer lip outwardly marginated; spire obtuse, papillated. Operculum unknown.

"*Dimensions,* $\frac{3}{4}$ and $\frac{1}{4}$ line."

Recent, Draguignan, South of France, Carouge, near Geneva (*Jeffreys*).

This species is, I believe, abundant at each of the localities in which it is found, and particularly so at Clacton. The generality of specimens do not exceed the dimensions given by Michaud to the recent shell, though some few of my fossils have attained to the tenth of an inch in length, from the elongation of the spire, without increasing the number of volutions, in which case the suture is much deepened. The apex is very obtuse, the vertex being flattened, with the apical or embryonic portion broad and inflated. The outside of the aperture is strengthened by a thickened whitish rib, generally at a short distance from the margin, which is sharp and plain; the aperture is ovate, with the major axis in a longitudinal direction, scarcely at all impressed by the body whorl.

This is not now found living in Britain, and I have been unable to obtain any information respecting the soft parts of the animal. The thickened margin would rather indicate its having a calcareous operculum, like the genus *Bithinia*, but I have never found one, although the shell is very abundant.

NATICA SMITHII, *Brown.*

BULBUS SMITHII. *Brown.* Mem. Wern. Soc., vol. viii, p. 104, pl. 1, fig. 18, 1838.
NATICA — *Forbes.* Mem. Geol. Surv., vol. i, p. 430.

"The only specimen ever met with of this most interesting shell, a member of the division of ampullariform Naticæ, was found by the Duchess of Argyle in the Pleistocene Beds at Ardincaple. That specimen was presented to Mr. Smith, and was figured and described by Captain Brown, in the eighth volume of the 'Wernerian Transactions.' It has since, unfortunately, been destroyed. From its delicacy it is not likely to occur in the more disturbed beds of the Drift, but should be looked for in the Clyde Beds. It is extremely probable that when an opportunity for comparison may occur, the *Bulbus Smithii* will be found to be identical with *Natica flava*, of Gould; a rare living inhabitant of the Newfoundland Bank." —*Forbes.*

Mr. Smith, of Jordan Hill, to whom I have applied in the hope of being able to add something to the above remark, expresses his deep regret at the loss of the specimen referred to, which, he says, is the only one he has either seen or heard of.

NATICA BOWERBANKII, *Forbes.* MSS. Mem. Geol. Survey, vol. i, p. 430.

"In Mr. Bowerbank's Bridlington Collection there is an imperfect specimen of a very distinct species of *Natica*, which does not agree with any living or fossil species known to me. It has a smooth, ventricose body whorl, angulated above, and a depressed spire. It equals *Nat. monilifera* in size."—*Forbes.*

This is another, at present uncertain, species upon which, I regret to say, my endeavours to add a little information have not been crowned with success. Mr. Leckenby, who is well acquainted with the Bridlington fossils, kindly undertook to make inquiry for another specimen, but was equally unsuccessful. The shell in Mr. Bowerbank's Museum is in that condition from which a determination would not be at all satisfactory.

NATICA ALDERI, *Forbes.*
(NATICA NITIDA, *Donovan.*)

This is said to have been found in the Drift Beds of Ireland and Scotland.

TROCHUS CRENULARIS. Crag Moll., vol. i, p. 123, t. 13, fig. 7.

The specimen figured under this name at the above reference, I am now inclined to believe is a foreigner, and that the species does not belong to the Coralline Crag.

TROCHUS MAGUS, *Linn.*

Found in the Irish Drift Beds.

MARGARITA UNDULATA, *G. B. Sowerby.*
TROCHUS INFLATUS. *Smith.* Mem. Wern. Soc., vol. viii, pl. 1, figs. 10, 11.

Found in the Irish Drift and in the Clyde Beds.

BULLA CONULOÏDEA, *S. Wood.*

The shell called *B. conulus*, S. Wood, 'Mon. Crag. Moll.,' part 1, p. 173, t. 21, fig. 2, is, I now believe, distinct from the Paris Basin shell, to which I had assigned it. A better examination with more specimens, some of which were obligingly forwarded to me by M. Deshayes, have shown that although the two shells are very closely allied, the differences are such as to warrant a specific separation. I therefore propose the above alteration for the Crag shell. The species from the Basin of the Adour, called by Grateloup, *B. conulus* and *B. angistoma*, which I had considered synonymous, I have been unable to examine whether they be more nearly related to the Older Tertiary or to the Crag species.

BULLA HYDATIS, *Linn.*

This is enumerated in Mr. Dixon's 'List of the Upper Tertiary Fossils at Bracklesham.'

BULLA AMPULLA.

Mentioned in Sir R. Murchison's 'Silur. Syst.,' p. 533, as a Tertiary fossil, found at Kempsey, near Worcester. I am unable to say whether these two be the same or different species.

BULLA ACUMINATA. *S. Wood.* Crag. Moll., vol. i, p. 174.

In the Synoptical Table at the end of the first volume of the 'Crag Mollusca' is a × against this name in the line of Eocene fossils, as if intended to denote the presence of the recent species, *acuminata*, during the Period of the Older Tertiaries.* This is a misprint; no mention is made of such existence in the text at the above reference. An unfigured species has, however, been found at Barton, closely resembling the recent shell in having a pointed or acuminated termination, with the spire enveloped, but the Older Tertiary fossil is evidently distinct.

Systematists appear to labour under great difficulties in the generic divisions of the Bullæ, the form of the shell appearing almost alone to determine the distinctions. Our little species rejoices in the title of several generic aliases. Prefessor Lovén has removed it from *Bulla* into a proposed genus called *Cylichna*. Messrs. Forbes and Hanley placed it (with a doubt) in *Ovula*. It was called *Volvula* by Adams; and Mr. Woodward has united it with *Tornatina*. A knowledge of the animal, when possessed, will assist in its true assignment, and may possibly justify a different position; but at present the shell alone is all we have to guide us as to its true relations, and from this it appears to differ only as a species from *Bulla cylindracea*, and other cylindrically convoluted shells, and whatever may be considered more essential distinctions for generic separation in such inflated species as *Bulla ampulla*, &c., the simple difference in this, at least from the cylindrically formed shells, is merely a greater elevation of the outer lip, so as to conceal the turns of the spire: or perhaps it would be more correct to speak of it as a prolongation of the outer lip into a pointed termination for the excurrent canal, instead of being at the junction or suture of the volution; an approximation to this may be seen in those species, such as *B. umbilicata*, &c., in which the outer lip is extended retreally or retreatingly, so as to cause a concavity where the spire is depressed but not hidden.

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* This column contains also a few other crosses, intimating the supposed existence during the Eocene Periods of those species against which they are attached. Since that table was published I have given to them a more special examination, and although there are two or three (particularly the species of *Pleurotoma*) that present many characters in common, there is not one therein included that can be *undoubtedly* said to have lived during the joint Periods of the Older Tertiaries and the Crag.

APLYSIA? ASCIOLA, *S. Wood.* Tab. XXXI, fig. 24 *a*, *b*.

Locality. Cor. Crag, Sutton, Sudbourne.

This fossil has been in my possession for the last twenty years, with the above doubtful generic name, and my endeavours to obtain information as to its true character have hitherto been unsuccessful. There is a strong resemblance between it and one of the opercular valves of a Barnacle (*tergum*), but, with all my search, I have never been able to find what might be considered as its opposing portion—all my specimens have the point or apex inclining in the same direction; still I thought it might possibly belong to the Cirripedia; I therefore requested Mr. Darwin would be kind enough to give me his opinion upon them, but they were rejected by him as not belonging to any animal in the group he has so ably investigated.

Its form is that of a "little hatchet," and I have assumed it to be the calcareous portion of an internal shell, belonging, probably, to the section called *Aclesia* by Rang, and have placed it provisionally in the above generic position. At least fifty specimens have been found by myself, and these present considerable variation *inter se*, but I think they may be all referred to the same specific animal. One specimen is from Sudbourne; and this, though more than double the size of those from Sutton, was probably only from a larger individual, varying in that respect like the specimens of *Scalpellum*, as well as a few of the Mollusca from the same two localities.

Two fossils from the Upper Tertiaries of Sicily have been doubtingly described as species under the above generic title.

The inner portion or lining of *Pectunculus glycimeris* sometimes separates from the rest of the shell, and is occasionally found in the Red Crag; and when in that condition it strongly resembles the figure of *Aplysia grandis*, Philippi, 'En. Moll. Sic.,' vol. ii, t. 18, fig. 10, *a*, *b*; but I have not been able to see the Sicilian fossil.

PECTEN MAXIMUS. Tab. XXXI, fig. 25.

PECTEN MAXIMUS. *S. Wood.* Monog. of Crag Moll., *ante*, p. 22.

A single specimen of the flat valve of a species in this genus has lately been given to me by Mr. Whincopp, who obtained it from Sutton.

Although a considerable amount of variation is exhibited in my large series of specimens of what I have considered as *P. maximus* from the Coralline Crag, I have not seen anything quite so anomalous as is presented by this Red Crag specimen, and confess to be somewhat perplexed respecting it; still there is something peculiar in the arrangement of the ribs of this shell to warrant the belief that there has been a failure in their number of about one half, perhaps caused by what might be called a duplicature or union of the organs by which they were produced, and that it is nothing more than a monstrous form of the common British species.

There are six, or perhaps eight ribs, including those irregular ridges at the shoulders, rounded and smooth, probably made so by attrition; between them are some smaller rays, varying from two to five. In the recent shell these intermediate rays are also variable, and, in some specimens, they are very distinct and prominent, both between and upon the ribs, while in others they are entirely absent.

In order, therefore, to avoid the introduction of a species upon the slender evidence afforded by this specimen, I have called it *P. maximus*, var. *larvatus*.

PECTEN POLYMORPHUS, *Bronn.* Tab. XXXI, fig. 20.

PECTEN POLYMORPHUS. *Bronn.* Reise, p. 627, sec. Phil.
— STRIATUS. *Marcel. de Serr.* Geog. des Terr. Tert. du Midi de la France, p. 131.
— STRIATULUS. *Lamarck.* Sec. Philippi.
— INÆQUICOSTALIS. *Id.* Sec. Philippi.
— ISABELLA. *Lamarck.* Sec. Philippi.
— FLAGELLATUS. *Id.* Sec. Philippi.
— FLEXUOSUS. *Id.* Sec. Philippi.
— POLYMORPHUS. *Phil.* En. Moll. Sic., vol. i, p. 79, t. 5, figs. 18—21.
— — *Dixon.* Geol. of Sussex, p. 16, fig. 3, 1850.
— — *Sismond.* Syn. Meth. Inv. Ped., p. 13, 1847.
OSTREA STRIATA? *Brocchi.* Conch. Foss. Subap., p. 577, t. 16, fig. 17.
— DISCORS. *Id.* Conch. Foss. Subap., p. 581, t. 14, fig. 13.
— COARCTATA. *Id.* Conch. Foss. Subap., p. 574, t. 14, fig. 9.
— PLICA. *Poli.* Utr. Sic., t. 28, figs. 1—5.

Spec. Char. "*Testâ subæquivalvi, suborbiculari, latiore quam longâ, longitudinaliter undulato-plicatâ, striatâ aut lævi, plicis* 5—12, *auriculis amplis subæqualibus, utraque basi angustatâ; i. e., sinu angulum rectum formante a lateribus divisâ.*"—Philippi.

Shell nearly equivalve, suborbicular, broader than long, longitudinally ribbed or plicated; ribs 5—12; auricles large and slightly unequal, and angulated at the base on each side.

Diameter, 1 inch.

Locality. Bracklesham.

This shell is, I believe, not very rare at the above locality, to which place, as far as I know, it appears to be restricted, as a British fossil.

It much resembles *P. Danicus,* and is, like it, subject to great variation; it differs, however, more especially in its auricles, which are larger and more equal.

This is a living species in the Mediterranean, and is found fossil at Gravina, according to Philippi.

The specimen figured is in the British Museum.

LIMOPSIS PYGMÆA. *Ante,* p. 71.

This is no longer an extinct species; it has been recently obtained alive by Mr. M'Andrew in the Arctic Regions.

LUCINA COLUMBELLA. *Ante,* p. 143.

I have been unable to obtain any further information respecting the integrity of this species. Its claim to the Red Crag is, I suspect, very doubtful.

CRYPTODON SINUOSUM. *Ante,* p. 134.

At the above reference the Older Tertiary shell, *Lucina Goodallii,* was considered only as a variety, as also the Boom shell, *Axinus Benedenii,* De Koninck, and both were introduced as synonyms to the above Crag fossil. A better examination with fresh specimens induces me now to believe them distinct.

MACTRA TRIANGULATA, *S. Wood.* Tab. XXXI, fig. 21 *a—d.*

Spec. Char. Testâ parvâ, ovato-triangulatâ, utroque obtusissimè carinatâ, crassâ, striatâ aut sulcatâ; dentibus lateralibus magnis, perpendicularibus striatis.

Shell small, ovately and broadly triangular; both sides obtusely keeled, thick, striated, or rather sulcated; lateral teeth large, perpendicularly striated.

Length, $\frac{5}{8}$ inch.

Locality. Cor. Crag, Sutton.

Small specimens of this species are abundant, but they are always more or less decorticated, and, as the principal distinction is in the sculpture, they have until now remained in my cabinet as varieties of *M. ovata.* Two or three individuals have recently been obtained with a sufficiency of the outer surface to show that a difference existed between it and the recent shell, *M. ovata* (*M. elliptica,* F. and H.), such as, I now believe, will entitle this to a separate specific position: instead of being covered with numerous, fine, irregular, and sometimes inosculating striæ, like those upon the recent British shell, our fossil is ornamented with regular and distinct ridges, and deep sulci between them, corresponding in that character with Brocchi's description of *M. triangula,* Renieri, "transversim sulcata;" but Messrs. Forbes and Hanley have determined the *triangula,* Phil., (*M. lactea,* Poli, which I presume to be the same,) to belong to *M. subtruncata,* Mont. With these discrepancies, and not having been able to see the Subapennine fossil, the above name is given provisionally until it can be better determined.

LUTRARIA RUGOSA, *Chemnitz.* Tab. XXXI, fig. 26 *a, b.*

MACTRA RUGOSA.		*Chemn.*	Conch. Cab., vol. vi, p. 236, t. 24, fig. 236, 1782.
LUTRARIA RUGOSA.		*Lamk.*	Hist. des An. s. Vert., tom. v, p. 469.
—	—	*Desh.*	Trait. Elem. Conch., t. 10, fig. 7.
—	—	*Sismonda.*	Syn. Meth. Ped. Foss., p. 23, 1847.
—	—	*Dixon.*	Geol. of Sussex, p. 17, 1850.
			Ency. Method., pl. 254, fig. 2 *a, b.*

Spec. Char. "*Testâ ovato-oblongâ, longitudinaliter densè striatâ, et quasi costatâ; areâ anticâ et posticâ glabratâ, obsoletè transversim striatâ; margine exteriore crenulato; colore extus ex albido flavescente, intus calcareo.*"—Chemn.

Shell ovately oblong, striated and costated; anterior and posterior areas generally smooth; lines of growth visible; outer margin crenulated or wavy.

Diameter, 2 inches.

Locality. Bracklesham. Recent, Coast of Portugal and Mediterranean.

This species, as a British fossil, appears to be confined to the above locality, where, I believe, it is not very abundant. This, like *Pecten polymorphus,* is no longer an inhabitant of our own shores. It is said to be found fossil at Astigiani. The specimen figured is in the museum in Jermyn Street.

Lutraria solenoides (*oblonga*) is enumerated in Mr. Dixon's 'List of Upper Tertiary Fossils at Bracklesham.'

PHOLADIDEA? Tab. XXXI, fig. 23.

This is the representation of a specimen obtained by Mr. John Middleton from the Crag "Diggings," near Woodbridge, and obligingly put into my hands for publication by Mr. Woodward, who considers it a genuine fossil of the Red Crag. It appears strongly to resemble the calcareous case of a species of boring Mollusc, and the generic position he has chosen for it is probably the correct one, belonging to the section *Martesia*, Gray. The interior is filled with mud or clay, and particles of sand, but the valves are gone. The exterior presents concentric ridges or elevations (about a dozen): these are in relief, and correspond with the depressions or furrows often seen in the cavities formed by the *Pholades*.

In my cabinet are some crypts of a similar form, excavated in a nodule of chalk found in the Red Crag, evidently the production of a boring Mollusc. In my specimens the valves are gone, and the walls in some of the cells are marked with concentric ridges.

The following existing British species, not found in any of the Crag Formations, are enumerated as belonging to the Upper Tertiaries of these kingdoms, in accordance with the authorities attached:*

PATELLA PELLUCIDA.
Irish Drift Beds. (*Forbes.*)

LUCINOPSIS (LUCINA) UNDATA.
Clyde Beds. (*Smith.*)

CARDIUM ACULEATUM.
Clyde Beds. (*Smith.*)

CYPRINA PROPINQUA.†
Clyde Beds. (*Smith.*)

CYTHEREA LÆVIGATA.†
Clyde Beds. (*Smith.*)

VENUS VERRUCOSA.
— STRIATULA (GALLINA).
Clyde Beds. (*Smith.*)

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* When the Palæontographical Society was first established the Crag Formations were the allotted portions for my Monograph, while the more recent deposits of the British Isles were intended to form the subject of a separate work by James Smith, Esq., of Jordan Hill; and it was not until after the publication of my first volume that any alteration was made in this arrangement. Mr. Smith found the fossils of these Uppermost Tertiaries were, with so few exceptions, identical with existing species, that he thought they were not of sufficient importance for a distinct work: it has therefore devolved upon me to mention those few that have become extinct upon our own coasts, and this will in some degree explain the irregular and imperfect manner in which I have introduced the species; and as this has taken me rather beyond my original intention, it has affected the correctness of my former title-page, and rendered it necessary to substitute a new one.

† These two species, noticed by Mr. Smith in his paper upon the 'Post-Tertiary Deposits of the Basin of the Clyde,' 'Trans. Geol. Soc.,' 2d series, vol. vi, p. 155, he still thinks are decidedly distinct, and such

TAPES PULLASTRA (VENERUPIS PERFORANS).

— DECUSSATA.

Clyde Beds. (*Smith.*) Bracklesham.* (*Dixon.*)

CERATISOLEN (SOLEN) LEGUMEN.

Clyde Beds. (*Smith.*)

ANATINA CONVEXA.

Irish Drift Beds. (*Forbes.*) Clyde Beds. (*Smith.*)

The woodcut (p. 328) is the representation of a specimen belonging to Mr. Acton, who kindly put it into my hands for illustration as a new species, but I have no doubt of its true position, and it is placed unhesitatingly in specific association with the characteristic shell of the Red Crag.

This extraordinary individual is the widest deviation from the normal condition of a species that has ever come under my observation, for although it is not very uncommon to see a fresh-water discoidal shell, owing to a little deflection in its spiral, assume a turriculated or conical character, it is exceedingly rare to see an elevated or turriculated shell become depressed into a discoidal form, with its volution upon a horizontal axis. My old friend *Littorina littoreus* has indulged in extraordinary vagaries, but our present specimen has carried its divergence to an extreme of deformity, emphatically showing that in the practical study of the Univalve Mollusca little real aid is to be derived from any mathematical accuracy in the angle of volution.

There is, it is well known, an inherent tendency to variation in some species, and this, though not wholly dependent upon external conditions, may be aggravated by what is unfavorable to a healthy development. The abnormous forms of *Littorina littoreus*, *Purpura lapillus*, and *Cardium edule*, found in the Estuary Deposits near Norwich, arose, I imagine, from the latter circumstance, as a very large number of individuals in this locality have become more or less distorted; and as these species in the recent state are rarely eccentric, their deformities were attributed by myself to some extraordinary alteration of the medium in which the animals lived, probably from changes produced by ice or by an excess of outflow whereby the saline properties of the water were prejudicially and suddenly diluted; but the varieties of a species in the

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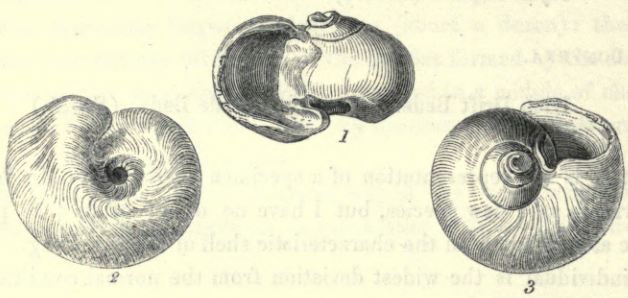
was, he says, the opinion of the late Professor E. Forbes, in whose hands they were placed: unfortunately they are not now to be found.

In the report of the twenty-fourth meeting of the British Association, held at Liverpool, September, 1854, p. 78, 'Geol. Sect.,' is a communication by Mr. P. P. Carpenter, respecting some land, fresh-water, and marine shells, obtained by Miss Bright from the depth of one hundred feet in the sinking of a well on the banks of the Avon, at Birlingham, Worcestershire. Among the fresh-water shells is mentioned *Limnæa glutinosa;* and with the marine ones are "two minute undetermined Bivalves, quite distinct from any known, either recent or in the Crag. One is an *Astarte*, very flat and triangular, with sharp ribs like *Gouldia Pacifica*, C. B. Ad.; the other is a ? *Lucina*, somewhat the shape of *L. columbella*, with a deeply cut lunule as in *Opis*, beginning with concentric ridges, then suddenly changing into radiating ribs."

* Some of the fossils at this locality appear to exceed considerably in dimensions the same species still in existence in our own seas. A specimen of *T. decussata*, given to me by Mr. Bristow, has attained the length of 3 inches. I have lately seen a fine specimen of *Pholas crispata*, measuring 4 inches, and am informed they have been found in this Deposit nearly 5 inches in length.

Red Crag may with less probability be assigned to such a cause, as there is no good reason to believe that the Mollusca in the remains of that Formation resided in very close proximity to the regions of fresh water. The unnatural condition of the present specimen appertains more to the individual than either to a species or to a colony, and may have arisen from some accidental circumstance, or from unsuitable food, or, what is perhaps more likely, the unlucky animal may when young have been caught and retained in some confined position, preventing its growth in a natural direction. It is an immature individual, although it has no doubt been "curtailed of its fair proportions" in consequence of its deformity.



Trophon antiquum, var. *contrarium planorbulum*.
From the Red Crag, Sutton.

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INDEX TO VOL. II.

BIVALVES.

	PAGE
Abra alba	237
fabalis	238
obovalis	240
prismatica	239
Acardo	160
Acephala testacea	1
Actinobulus	164
Æglia	97
Agaria	164
Agina purpurea	284
Alasmodonta	97
Aligena	117
Aloïdes	273
Amblema	97
Amphidesma	237
Amusium	20
Amygdalum	75
Anatina	258
Anchomasa	294
Andaria	75
Anodon	101
Anodonta *anatina*	102
cygnea	102
intermedia	102
piscinalis	102
ventricosa	102
Anomalocardia	75
Anomia aculeata	9
cœpa	8
costata	8
ellipticus	8
Anomia ephippium	8
lens	8
margaritacea	8
patelliformis	9
radiata	8
rugosa	11
squamula	8
striata	11
striolata	9
sulcata	8
undulata	10
undulatim-striata	11
Anomya	6
Anonica	51
Antigone	209
Aphrodita	160
Appius	101
Arca *Britannica*	76
cardissa	76
flammulata	67
fluviatilis	93
fusca	76
Gaimardii	76
lactea	77
lactanea	78
modiolus	77
navicularis	76
noæ	76
nodulosa	78
papillosa	76
pectunculoïdes	79

	PAGE
Arca *perforans*	77
pusilla	79
Quoyi	78
raridentata	79
tetragona	76
Arcinella carinata	289
Arcopagia	224
Arctica	196
Arctöe	214
Arcturus	164
Arenaria	235
Argina	75
Argus	20
Artemis compta	216
exoleta	215
ferruginosa	135
lentiformis	215
lincta	215
sinuata	216
Asa	214
Astarte *angulata*	183
antiquata	182
Arctica	176
Banksii	183
Basterotii	177
bipartita	180
borealis	175
Burtinii	188
compressa	183
corrugata	176
crebricostata	186
crebrilirata	184
cyprinoides	176
Damnoniensis	182
digitaria	190
elliptica	181
excurrens	191
Gairensis	181
Galeotti	185
gracilis	185
imbricata	212
incerta	186
incrassata	176
lactea	176
lævigata	174
lirata	185
multicostata	183

	PAGE
Astarte mutabilis	179
nitida	177
nitidula	178
obliquata	189
oblonga	180
O'Malii	180
ovalis	182
parva	192
parvula	175
pallida	182
pisiformis	188
plana	176
planata	179
propinqua	185
pulchella	183
pygmæa	187
rugata	180
Scotica	182
semisulcata	176
striata	183
subtrigona	173
sulcata	182
triangularis	173
vulgaris	182
Atrina	49
Auriscalpium	263
Avicula *aculeata*	51
Anglica	51
Atlantica	51
hirundo	51
Tarentina	51
Axinæa	65
Aximedia	97
Axinus	133
Azor variabilis	223
Bankia	298
Barnia	294
Barbatia	75
Beguina	164
Bequania	133
Biapholius	284
Bontæa	263
Bornia	117
Brachydontes	55
Bucardia	193
Byssoarca	75
Byssomya	284

	PAGE
Calceola	97
Calcinella	235
Callista	201
Callitriche	52
Calopodium	262
Canthyria	97
Capsa	218
Capisteria	218
Cardissa	151
Cardita analis	168
chamæformis	167
corbis	168
Dunkeri	168
exigua	169
minuta	169
nuculina	169
orbicularis	167
scalaris	166
senilis	165
squamulosa	165
tuberculata	166
Carditamera	164
Cardium *angustanum*	156
angustatum	157
anodonta	160
arcuatum	155
Balticum	156
boreale	160
clodiense	156
crenulatum	155
decorticatum	159
discrepans	152
echinatum	152
edentulum	160
edule	155
edulinum	155
Eichwaldii	156
fragile	159
glaucum	156
Groenlandicum	160
interruptum	159
Lamarckii	156
mucronatum	152
nodosum	153
nodosulum	154
oblongum	159
obliquum	156

	PAGE
Cardium Parkinsoni	158
pectinatum	155
rusticum	155
scabrum	153
spinosum	152
strigilliferum	154
tenue	155
venustum	160
vulgare	155
zonatum	155
Cepa	6
Cerastes	151
Chama *bicornis*	163
cornuta	163
gryhina	163
gryphoïdes	162
lacerata	163
sinistrorsa	163
unicornis	163
Chamæpholas	284
Chæna	292
Chion	218
Chione	206
Chimæra	49
Chironia	117
Chlamys	20
Cibota	75
Circe minima	198
triangularis	198
Circomphalus	214
Clausina	150
Clotho	284
Cochlodesma complanatum	263
prætenerum	264
Complanaria	97
Concha rupium	162
Conchæ	1
Conchifera	1
Coralliophaga cyprinoïdes	200
Corbicula	103
Corbula *bicostata*	274
complanata	275
cuspidata	273
donaciformis	275
elegans	274
gibba	274
granulata	268

	PAGE
Corbula *inæquivalvis*	274
nucleus	274
Olympica	274
planulata	274
rotundata	274
striata	274
sulcata	272
Corbulomya complanata	275
Cormopoda	1
Cornea	106
Corneocyclas	106
Crassina bipartita	180
borealis	176
compressa	176
convexiuscula	183
corrugata	176
Damnoniensis	182
depressa	181
elliptica	181
incrassata	176
Gairensis	181
minima	174
minutissima	174
Montagui	183
multistriata	183
nitida	177
obliqua	183
Omalii	180
ovata	181
Scotica	182
semisulcata	176
striata	183
sulcata	182
triangularis	174
Crenella	55
Cristaria	97
Cryptodon *bisinuatum*	134
ferruginosum	135
flexuosum	134
rotundatum	135
sinuosum	134
verticordia	150
Cucullæa	75
Cultellus tenuis	258
cultellatus	258
Cuneus	218
Cunicula	97

	PAGE
Curvula	49
Cuspidaria	271
Cyamium eximium	152
Cyanocyclas	103
Cyclas *appendiculata*	110
cornea	107
flavescens	107
fontinalis	112
gibba	112
palustris	109
pusilla	112
rivalis	107
rivicola	107
Cycladina	117
Cynetodonta	258
Cyprina *Arctica*	195
angulata	196
Defrancii	197
equalis	196
Islandica	196
Islandicoïdes	196
Lajonkairii	197
maxima	196
rustica	197
tumida	197
vulgaris	196
Cyphoxis	75
Cyrachæa	138
Cyrena consobrina	104
Duchastellii	104
Gemmellaria	104
trigonula	104
Cyrtodaria	290
Cyrtosolen	252
Cytherea *apicalis*	198
Chione	207
Cyrilli	198
cycladiformis	208
filosa	208
lævis	207
lamellata	210
lenticula	198
minima	198
minuta	198
nitens	207
pusilla	198
rudis	208

	PAGE
Cytherea *sulcata*	210
triangularis	198
trigona	198
Venetiana	208
Dacromya	87
Dactylina	294
Dactylus	294
Daphne	75
Decadopecten	20
Dendostrea	12
Dentipecten	20
Diceratia	193
Didacna	151
Didonta	284
Diodonta	217
Dione	206
Diplasma	97
Diplodonta Astartea	146
dilatata	145
parvula	146
rotundata	144
Dipsas	101
Dithyra	1
Ditoma	1
Donax *anatinus*	219
complanata	220
glabra	220
irus	205
longa	220
politus	220
ruber	219
striatella	233
truncata	219
trunculus	219
vittatus	219
Dosina	209
Dosinia	214
Echion	6
Egeria	218
Egesta	209
Elatobranchia	1
Ellipsaria	97
Elliptio	97
Embla Korenii	268
Endocephala	1
Ensatella	254
Ensis complanatus	255
Erycina trigona	275
Erycinella ovalis	171
Euglesia	108
Exoleta	214
Fenestella	6
Galaxura	263
Galeomma	123
Galileja	108
Gari	221
Gastrana laminosa	217
Gastrochæna *cuneiformis*	292
dubia	292
faba	293
fulva	292
hians	292
modiolina	292
pholadia	292
Poliana	292
Geloina	103
Glans	164
Glaucion	42
Glaucus	42
Globus	162
Glossus	193
Glycimeris angusta	291
arctica	281
Norvegica	281
vagina	291
Gobræus	221
Goodallia	172
Gryphus	151
Hecuba	218
Hemicardium	151
Hemimactra	240
Hemiodon	97
Heteroconcha	206
Hiatella	284
Hinnites Corteseyi	19
Dubuissoni	19
irregularis	33
pusio	33
Hinnus	18

	PAGE
Hippagus *acuticostatus*	150
verticordius	150
Hypogæa	254
Hyridella	97
Iphigenia	218
Iridea	97
Irus	204
Isoarca	75
Isocardia cor	194
crassa	194
fraterna	194
globulosa	194
Hibernica	194
lunulata	194
Markoei	194
rustica	194
ventricosa	194
Ixartia	258
Janira	20
Jatronus	161
Kellia ambigua	120
coarctata	123
cycladia	122
deltoidea	115
dubia	120
elliptica	121
flexuosa	121
lactea	118
nitida	116
orbicularis	120
pumila	124
rubra	125
suborbicularis	118
Lacinia	161
Lamellibranchiata	1
Lampsilis	97
Lamproscapha	101
Lanistes	55
Lanistina	55
Lasea	117
Lasmonos	97
Lasmigona	97
Lastena	101
Latona	218
Laturnula	263
Lavignon	235
Lazarus	161
Leda *arctica*	88
caudata	92
lanceolata	88
minuta	92
myalis	90
oblonga	88
pernula	93
pygmæa	95
rostrata	93
semistriata	91
Thraciæformis	96
truncata	94
Lembulus	87
Lentidium	273
Leptodea	97
Lepton deltoideum	115
depressum	116
nitidum	116
squamosum	114
Ligula alba	237
Boysii	237
donaciformis	239
prismatica	239
Ligumia	97
Lima *aperta*	44
bullata	44
elongata	47
exilis	43
fragilis	44
hians	44
inflata	44
Loscombii	45
oblonga	44
ovata	48
plicatula	46
subauriculata	47
sulcata	47
sulculus	47
tenera	44
vitrina	44
Limatula	42
Limicola carnaria	231

	PAGE
Limopsis aurita	70
pygmæa	71
Limnopsis	69
Limula	42
Listera	235
Loripes divaricata	137
ellipticus	121
undularia	137
Lucina *alba*	139
antiquata	139
arcuata	137
balaustina	227
borealis	139
columbella	143
commutata	137
contracta	139
crenulata	140
curviradiata	190
decorata	141
dentata	140
digitalis	190
digitaria	190
divaricata	137
ferruginosa	135
Flandrica	139
flexuosa	134
mitis	139
oblonga	121
radula	139
Sarsii	134
sinuata	134
sinuosa	134
squamosa	141
striatula	140
trifaria	137
vulnerata	143
Lucinopsis Lajonkairii	148
Lunaria	75
Luticola	97
Lutricola	235
Lunulacardium	151
Lutraria elliptica	251
vulgaris	251
Lux	221
Lymnadia	97
Macha strigillata	253
Mactra arcuata	244
artopta	244
cinerea	241
congesta	247
crassa	245
crassatella	245
constricta	249
cuneata	248
deaurata	249
denticulata	249
dubia	247
elliptica	247
Euxinica	248
glauca	241
helvacea	241
inæquilatera	249
lactea	241
limbata	248
magna	241
modicella	249
Neapolitana	241
obtruncata	248
ovalis	247
procrassa	245
solida	246
straminea	241
striata	247
stultorum	241
subtruncata	248
truncata	245
vulgaris	246
Macoma	224
Mactrina	172
Mactroïdea	172
Macrophyllum	151
Malleolus	298
Mantellum	42
Margaritifera	51
Megadomus	97
Meretrix	206
Mesodesma Jauresii	250
Metaptera	97
Modiola *asperula*	64
barbata	58
costulata	60
cylindroïdes	60
discors	63

	PAGE
Modiola *discrepans*	63
Europea	62
Gibbsii	58
grandis	57
hyalina	61
marmorata	62
modiolus	57
papuana	57
Patagnæ	60
phaseolina	59
Prideauxiana	64
rhombea	64
sericea	61
tumida	62
vulgaris	57
Modiolaria	55
Modiolarca	55
Modiolopsis	55
Monocondylea	97
Monodacna	151
Montacuta bidentata	126
cylindrica	131
donacina	131
ferruginea	130
ferruginosa	129
glabra	129
oblonga	129
ovata	130
pumila	124
substriata	128
tenella	130
truncata	127
Mulinia	240
Musculus	52
Mya *acuta*	279
arenaria	279
lata	279
mercenaria	279
ovalis	278
pullus	278
subovata	279
subtruncata	279
Swainsoni	278
truncata	277
Uddevallensis	278
Myalina	117
Myrtea	138
Mysca	97
Mysia Americana	146
Montagui	144
ornata	148
Mytilus *abbreviatus*	53
affinis	53
alæformis	53
angulatus	53
antiquorum	53
barbatus	57
borealis	53
curtus	57
curvirostris	57
densatus	55
dilatatus	53
edulis	52
elegans	52
flavus	53
galloprovincialis	53
hesperianus	55
incurvatus	52
notatus	53
pellucidus	52
plebeius	53
retusus	53
sericeus	61
sagittatus	53
solitarius	53
subsaxatilis	53
umbilicatus	57
vulgaris	52
Mytilicardia	164
Naia	97
Naidea	97
Navicula	75
Neæra *brevirostris*	273
cuspidata	273
jugosa	272
Neithea	20
Nicania	172
Nucinella miliaris	73
Nucula *argentea*	85
Cobboldiæ	82
corbuloïdes	95
decipiens	84

	PAGE
Nucula *depressa*	91
gibbosa	95
hyperborea	90
Jacksoni	93
lævigata	81
lenticula	95
lucida	84
margaritacea	85
minuta	92
nitida	91
nucleus	85
oblonga	93
oblongoïdes	90
Philippiana	95
pygmæa	95
rostrata	92
Ryckholtiana	84
Thraciæformis	96
tenera	84
tenuis	84
tenuisulcata	93
trigonula	86
truncata	94
Nuculina	72
Nux	106
Obliquaria	97
Obovaria	97
Odatelia	101
Odoncinetus	258
Omala	224
Orbiculus	214
Oreada	172
Ortygia	209
Osteodesma	258
Ostrea *borealis*	13
deformis	13
denticulata	13
edulis	13
foliosa	13
hippopus	13
lamellosa	13
parasitica	13
princeps	17
spectrum	13
undulata	17
ungulata	13
Oxysma	49
Palliolum	21
Pandora *glacialis*	271
inæquivalvis	270
margaritacea	271
obtusa	271
Pinna	271
rostrata	271
Panopæa *Aldrovandi*	283
Americana	283
arctica	282
Bivonæ	282
Faujasii	283
gentilis	283
glycimeris	281
Ipsviciensis	283
Norvegica	281
Spengleri	282
reflexa	283
Paphia deaurata	250
Papyridea	151
Parallelopipedum	75
Partularia	101
Paxyodon	97
Pecten *aspersus*	30
Audouinii	35
Bruei	29
complanatus	23
Clintonius	31
Danicus	30
distortus	33
domesticus	27
dubius	38
Dumasii	30
elongatus	33
flavus	35
fragilis	45
Gerardii	24
glabris	30
gloria-maris	33
gracilis	37
grandis	23
Islandicus	40
Jamesoni	30
Lamalii	29
lævis	27

	PAGE
Pecten *limatus*	33
lineatus	35
Malvinæ	35
maximus	22
medius	23
monotis	41
muricatus	38
obsoletus	27
opercularis	35
Pandoræ	29
parvus	27
Pealii	40
pictus	29
plebeius	35
Princeps	31
Pseudamusium	30
pulchellinus	35
pusio	33
pygmæus	25
radians	35
reconditus	35
rectangulus	35
scabrellus	38
septemradiatus	30
serratus	33
similis	23
sinuosus	33
Sowerbyi	35
spinosus	33
squamulosus	33
striatus	33
sublævigatus	31
subdiaphanus	24
subrufus	35
sulcatus	35
tigrinus	27
triradiatus	30
tumescens	38
tumidus	25
varius	41
ventilabrum	38
20-*sulcatus*	35
Pectunculina	69
Pectunculus *decussatus*	67
glycimeris	66
latiarca	67
nummarius	67
Pectunculus *nummiformis*	67
pilosus	66
polyodonta	67
pulvinatus	67
pusillus	67
pygmæus	71
subobliquus	67
sulcatus	182
transversa	67
undatus	67
variabilis	67
Pelecypoda	1
Pennaria	49
Pera	108
Peronæa	172
Perlamater	51
Petasunculus	224
Petricolarius	205
Petrifora	204
Phacoïdes	138
Pholadidea *Loscombiana*	293
papyracea	293
striata	298
Pholadomya *candidoïdes*	266
Esmarkii	266
hesterna	266
Pholas *bifrons*	296
crispata	296
cylindrica	295
lamellata	298
papyracea	298
parva	296
Pholidea	297
Pholeobia	284
Pinna *ingens*	50
pectinata	50
Pisidium amnicum	109
fontinalis	111
Henslowianum	110
obliquum	109
pulchellum	111
pusillum	112
Pisum	108
Plagiola	17
Plagiostomus	42
Pleurobema	17
Pleuronectes	20

	PAGE
Pleurodon	72
Polyodonta	80
Poromya *anatinoides*	268
granulata	268
Poronia rubra	125
Potamida	97
Potomomya	273
Prisodon	97
Proptera	97
Psammobia *affinis*	222
Dumontii	222
Ferröensis	222
florida	223
lævis	222
muricata	222
tellinella	223
vespertina	223
Psammocola	221
Psammophila	250
Psammosolen	252
Psammotæa	221
Pseudamusium	20
Psilopus	160
Pteria	51
Ptychina	133
Pullastra	201
Puschia	172
Pyxis	20
Quadrula	97
Rhomboïdes	284
Rhombus	284
Rotundaria	97
Sanguinolaria fusca	231
Saxicava arctica	287
carinata	239
distorta	286
fragilis	288
gallicana	285
pholadis	286
rhomboïdes	287
rubra	287
rugosa	285
striata	285
sulcata	286
Scacchia elliptica	121
ovata	123
Scalinaria	97
Scapharca	75
Scaphula	75
Scaphura	75
Scrobicularia	235
Semele	235
Senilia	75
Serripes	151
Serrula	218
Siphonium	298
Solecurtus	252
Solena	254
Solenarius	254
Solen *candidus*	253
curvus	256
ensis	256
ensiformis	256
gladiolus	255
Hausmanni	256
ligula	256
novacula	256
siliqua	256
strigellatus	253
tenuis	258
Sphænia *angulata*	289
Binghami	276
costulata	128
cylindrica	288
Sphærella	143
Spharium	106
Swainsoni	278
Spisula truncata	245
Stola	161
Strophilus	101
Symphynota	112
Syndosmya	237
Syntoxia	97
Tapes aurea	202
perovalis	203
texturata	204
virginea	201
Taras	136
Tellimya	119
Tellina Balthica	231

	PAGE
Tellina balaustina	227
Benedenii	230
calcarea	228
carnaria	231
crassa	226
discors	232
donacilla	234
donacina	233
edentula	228
fabula	232
Groenlandica	231
inconspicua	231
lata	228
Llantivyi	233
lusoria	233
maculata	226
obliqua	228
obtusa	226
ovala	228
ovalis	228
ovaloides	227
prætenuis	230
proxima	228
rigida	226
rubra	231
sabulosa	228
scabra	226
semistriata	232
solidula	231
sordida	228
subcarinata	233
subrotunda	226
tenera	228
tenuilamellosa	227
triangularis	228
trifasciata	233
variegata	233
zonaria	230
zonata	231
Teredarius	298
Teredo *Bruguieri*	301
navalis	300
Norvegica	300
Tetraplodon	97
Thovana	294
Thracia *Conradi*	261
convexa	261
Thracia inflata	261
phaseolina	260
pubescens	259
ventricosa	252
Timoclea ovata	213
Thyatira	133
Thyatisa	133
Theliderma	97
Trigonella plana	235
Trigonocœlia sublævigata	67
Tridonta	172
Triquetra	97
Trisidos	75
Trisis	75
Truncilla	97
Trutina	269
Tuceta	65
Turtonia	132
Ungulina	136
Unio *antiquior*	98
granosus	98
incurvus	98
littoralis	98
nana	98
ovalis	99
Pianensis	98
pictoreum	100
subtetragonus	98
rostrata	99
tumidus	99
Uniopsis	97
Uperotus	298
Urynia	97
Vagina	254
Venericardia antiquata	165
anceps	169
chamæformis	167
corbis	169
intermedia	165
orbicularis	167
scalaris	166
senilis	165
Venerirupis	204
Venerupis irus	205

	PAGE
Venerupis Lajonkairei	148
Venus *Ænea*	202
aurea	202
Brogniarti	211
bucardium	196
casina	210
casinula	210
chione	207
circinata	139
cincta	210
compressa	175
Cyrilli	198
cycladiformis	208
Damnonia	182
discina	210
equalis	196
exoleta	215
fasciata	211
fragilis	145
gallina	210
gibbosa	210
imbricata	212
incrassata	178
Islandica	196
lactea	213
læta	201
lentiformis	215
lincta	213
literata	203
Lupinoïdes	148
lupina	213
mercenaria	196
minima	198
Montagui	183
multilamellosa	210
nebulosa	202
nitens	202
Venus *ochropicta*	208
ovata	213
Paphia	211
pectinula	213
pectunculus	208
pumila	198
radiata	213
reflexa	210
rhomboides	201
Rusteruccii	210
rustica	197
rudis	208
rupestris	205
sarniensis	201
senilis	210
similis	210
sinuata	213
Scotica	182
spadicea	213
sulcata	210
texturata	204
triangalaris	198
turgida	210
Venetiana	208
virago	202
virginea	201
Venulites	209
Velorita	103
Verticordia	149
Volsella	55
Xylophagus	298
Xylotrya	298
Yoldia	87
Zirfæa crispata	296

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INDEX TO APPENDIX.

	PAGE
Anatina convexa	327
Aplysia? asciola	322
Assiminea Grayiana	318
Buccinum ciliatum	315
Bulla acuminata	322
ampulla	322
conuloïdea	321
hydatis	322
Cancellaria scalaroïdes	316
Cardium aculeatum	326
Ceratisolen legumen	327
Crassina propinqua	326
Cryptodon sinuosum	324
Cytherea lævigata	326
Fossarus sulcatus	317
Fusus Bamffius	314
Barvicensis	314
crispus?	314
curtus	314
Forbesii	314
Helix fruticum	308
incarnata	309
ruderata	309
Jeffreysia? patula	319
Lacuna vincta	316
Limopsis pygmæa	324
Littorina neritoïdes	317
rudis	317
palliata	317
suboperta	317
Lucina columbella	324
Lucinopsis undata	326
Lutraria rugosa	325
solenoïdes	325

	PAGE
Mactra triangulata	324
Margarita undulata	321
Mitra cornea	311
ebenus	310
plicifera	311
Nassa Monensis	315
Pliocena	315
pygmæa	315
reticulata	315
Natica Alderi	321
Bowerbankii	321
Smithii	321
Odostomia conoïdea	317
eulimoïdes	317
truncatula	318
unidentata	317
Paludina marginata	320
parilis	320
Patella pellucida	326
Pecten maximus	323
polymorphus	323
Pholadidea	325
Pyrula acclinis	311
Rissoa soluta	318
Thermalis	319
Tapes decussata	327
pullastra	327
Trochus crenularis	321
magus	321
Trophon Fabricii	313
Norvegicum	312
propinquum	313
Turtoni	312
Venus gallina	326
verrucosa	326

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TAB. I.

Fig.

1. Ostrea Princeps, *page* 17.
   - *a.* inside view of lower valve.
   - *b.* outside ditto of upper valve.

2. Anomia aculeata, *p.* 9.
   - *a.* outside view of upper valve.
   - *b.* ditto ditto var. striolata.

3. Anomia ephippium, *p.* 8.
   - *a.* upper valve of a specimen of var. squamula, showing the radiating costæ produced by the animal adhering to the umbonal region of a Pecten.
   - *b.* id., specimen formed on the central portion of a Pecten.
   - *c.* id., outside view of var. cylindrica.
   - *d.* the testaceous plug, or lapideous portion of the adductor muscle, commonly called the operculum.

4. Anomia patelliformis, *p.* 10.
   - *a.* outside of upper valve.
   - *b.* ditto ditto var. undulata.

The lines indicate the size of the specimens.

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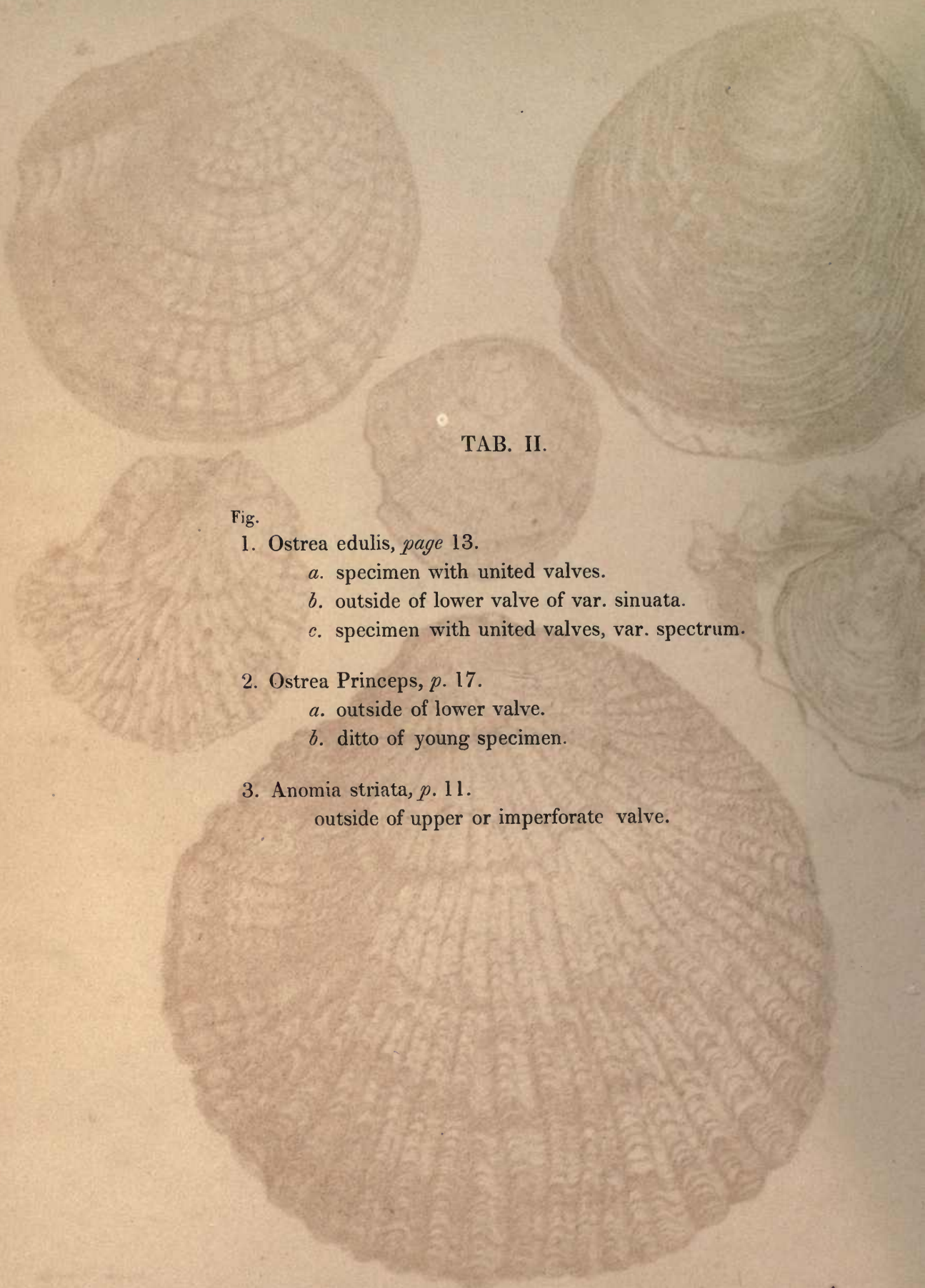


TAB. II.

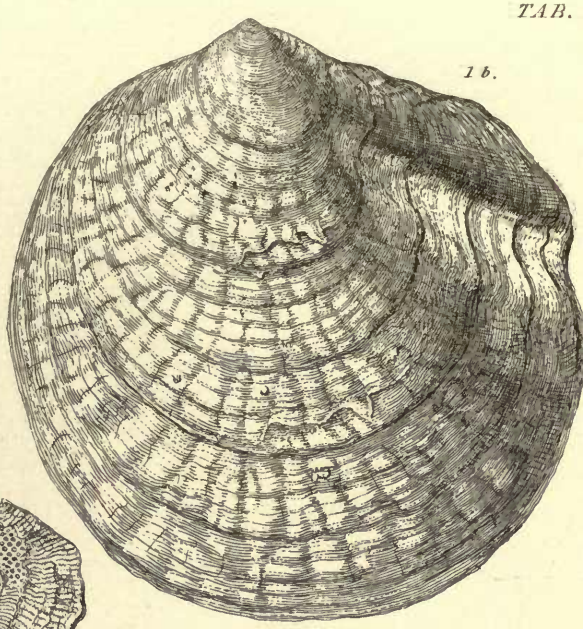
Fig.

1. Ostrea edulis, *page* 13.
   - *a.* specimen with united valves.
   - *b.* outside of lower valve of var. sinuata.
   - *c.* specimen with united valves, var. spectrum.

2. Ostrea Princeps, *p.* 17.
   - *a.* outside of lower valve.
   - *b.* ditto of young specimen.

3. Anomia striata, *p.* 11.
   outside of upper or imperforate valve.

1a.



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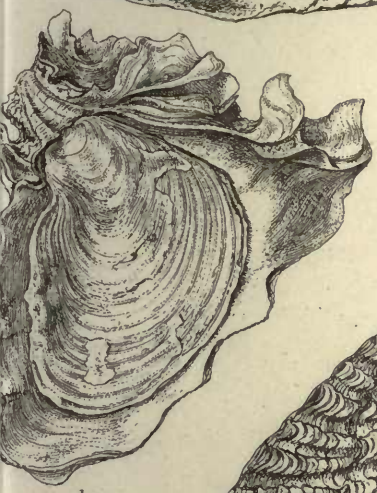
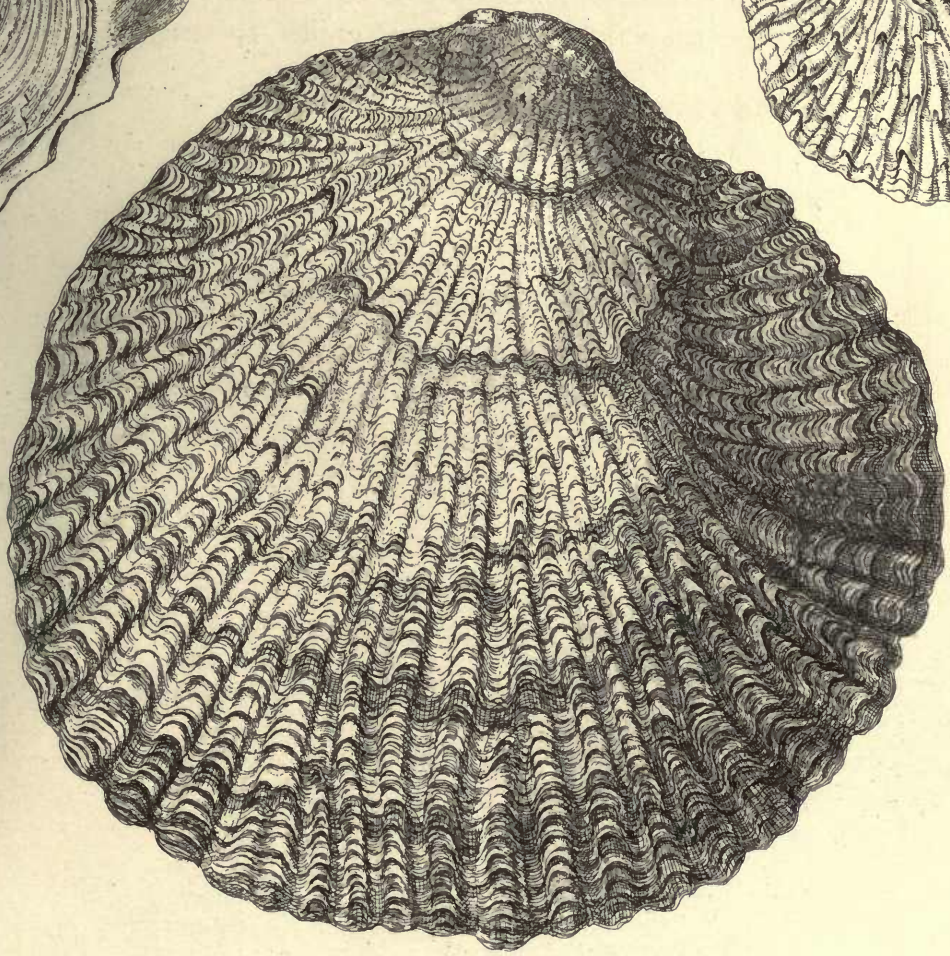
3.



1c.

2b.



2a.

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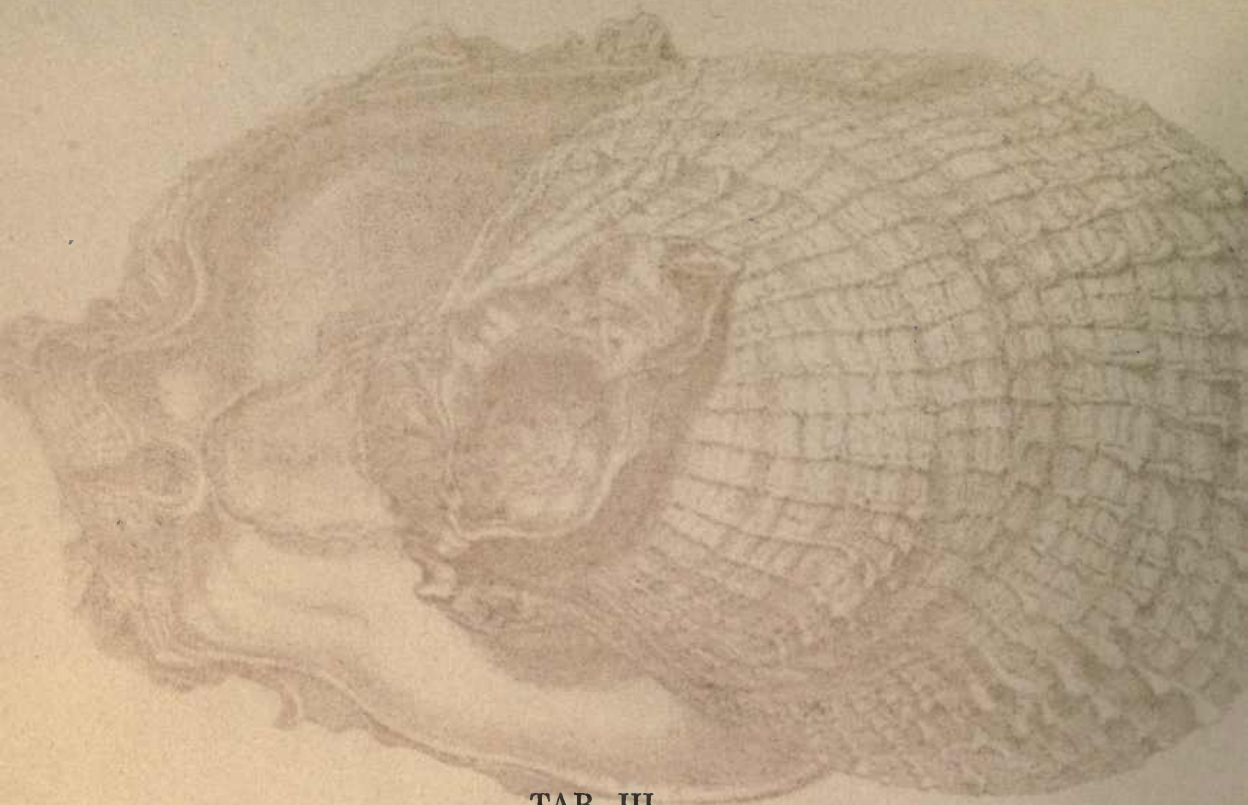
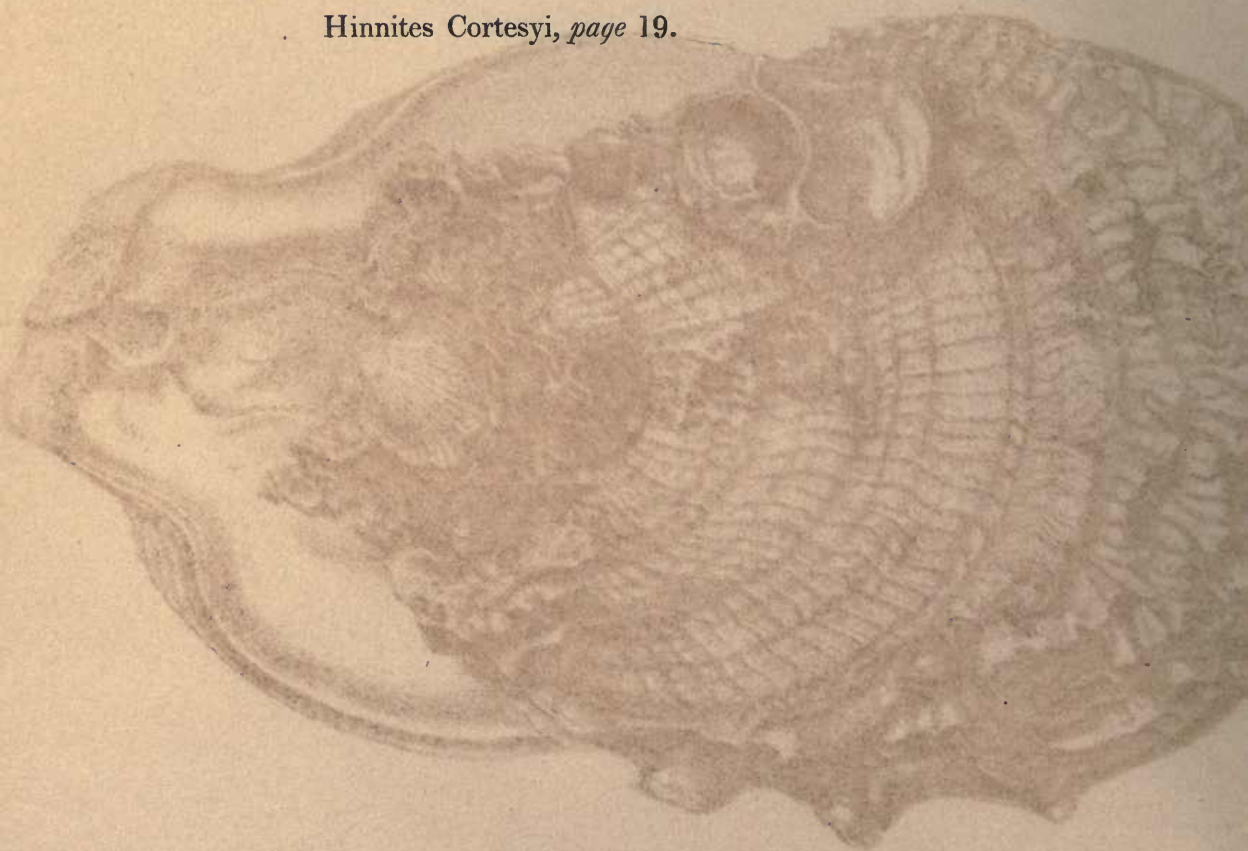
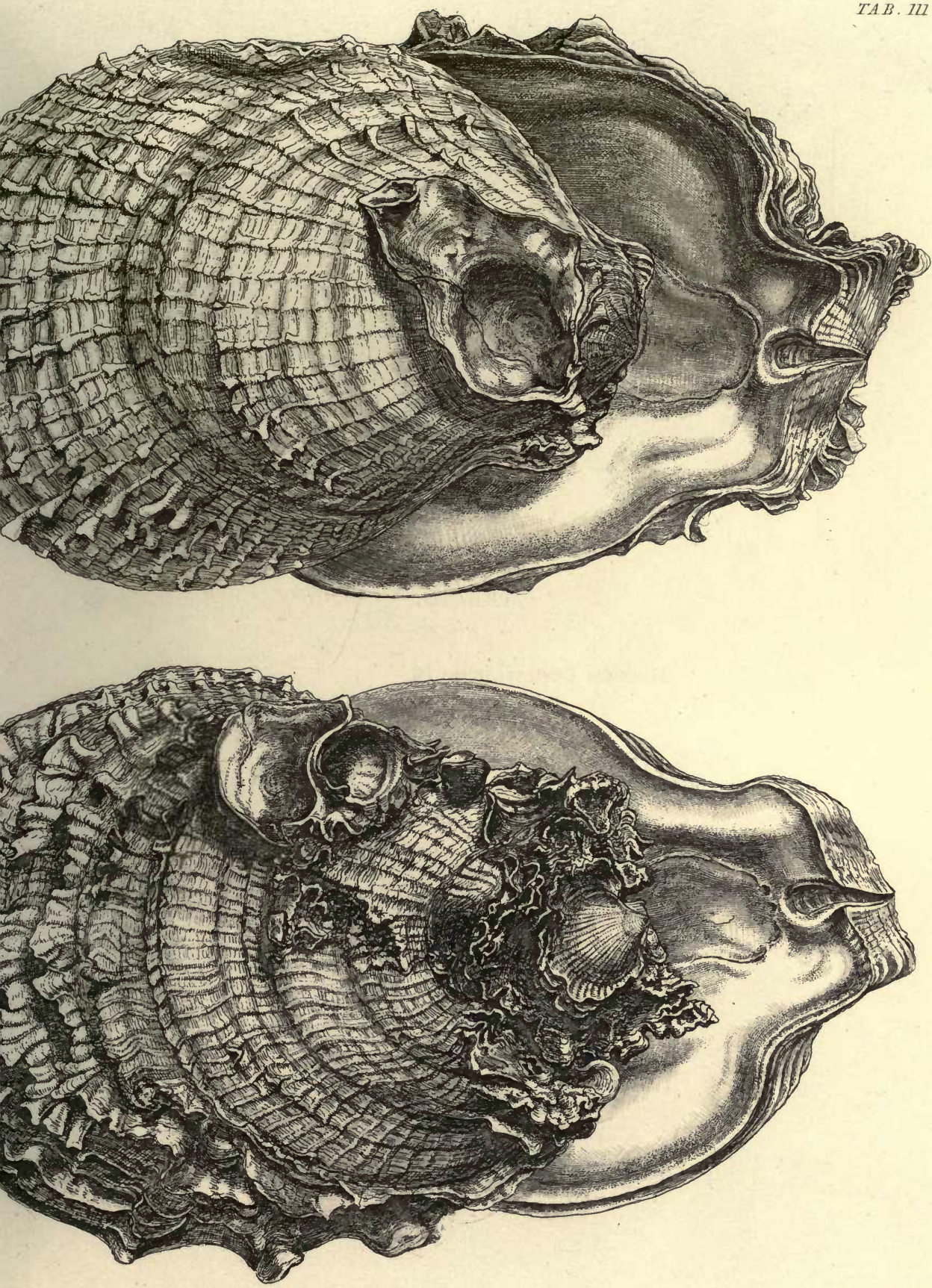


TAB. III.

Hinnites Cortesyi, *page* 19.





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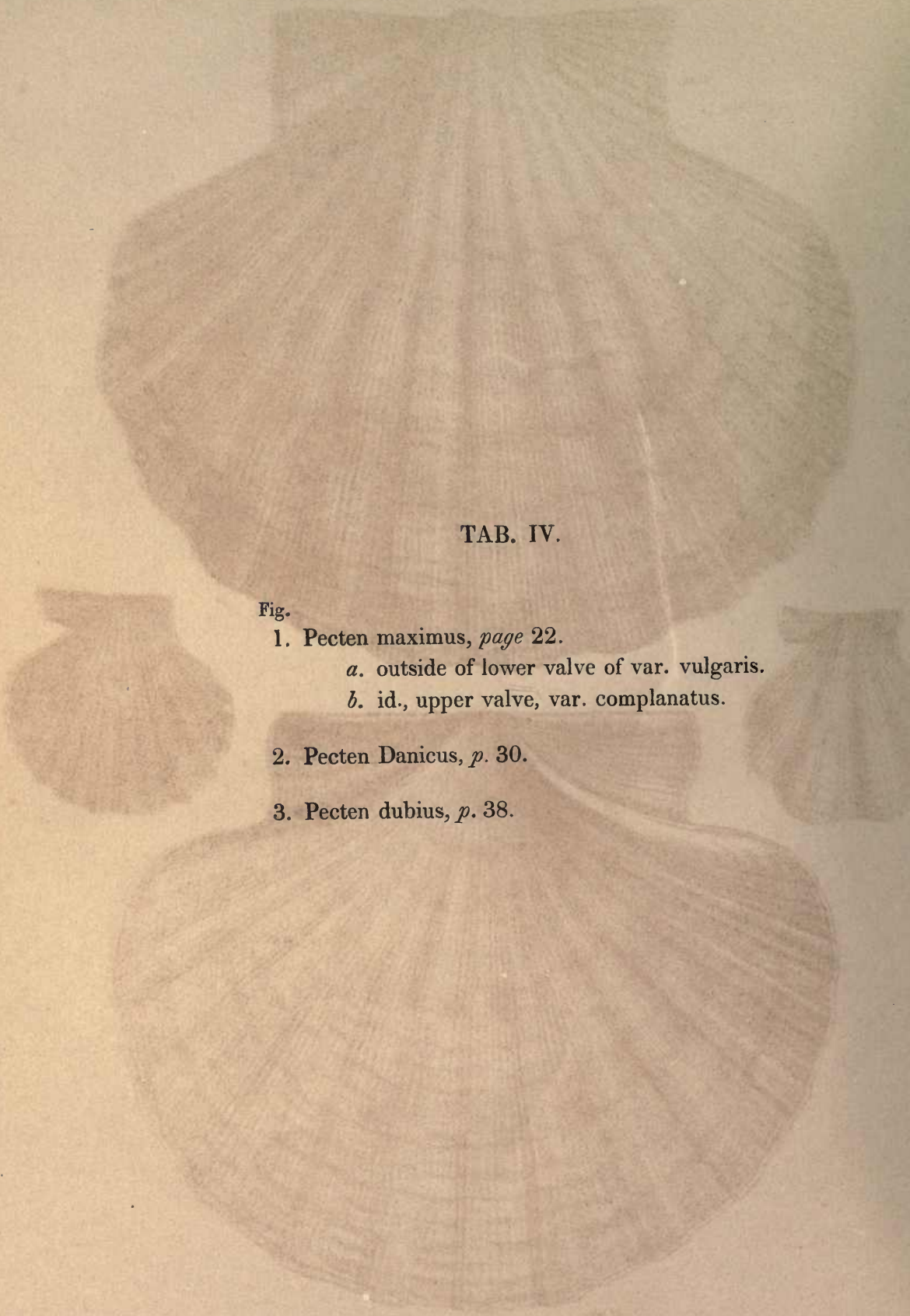


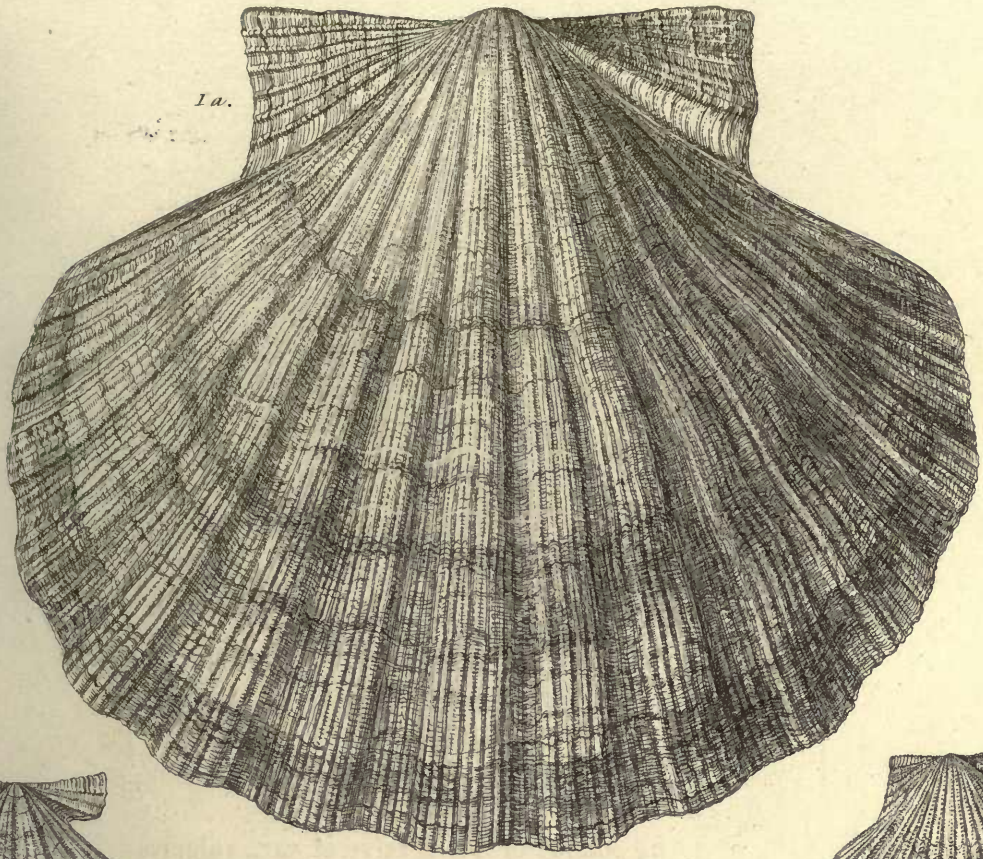
TAB. IV.

Fig.

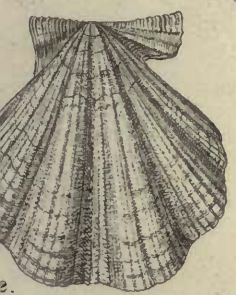
1. Pecten maximus, *page* 22.
   - *a.* outside of lower valve of var. vulgaris.
   - *b.* id., upper valve, var. complanatus.

2. Pecten Danicus, *p.* 30.

3. Pecten dubius, *p.* 38.



1 a.



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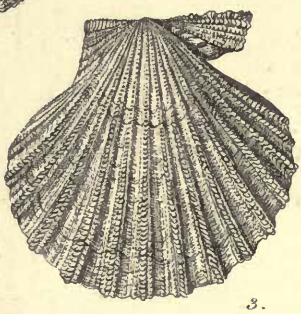

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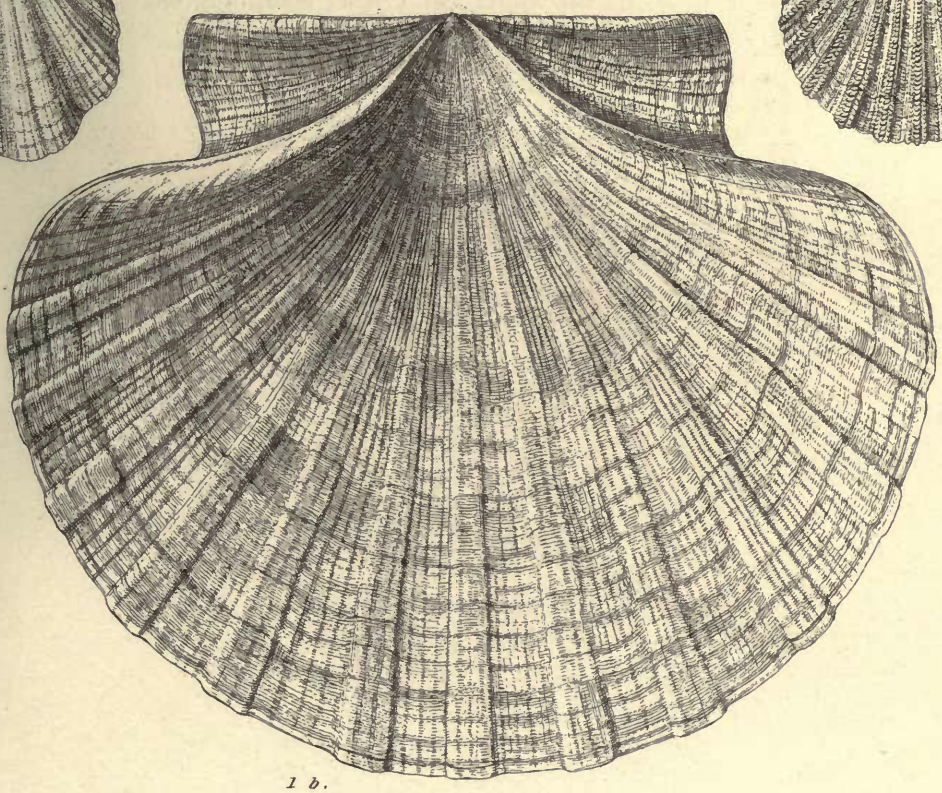

1 b.

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TAB. V.

Fig.

1. Pecten Islandicus, *page* 40.

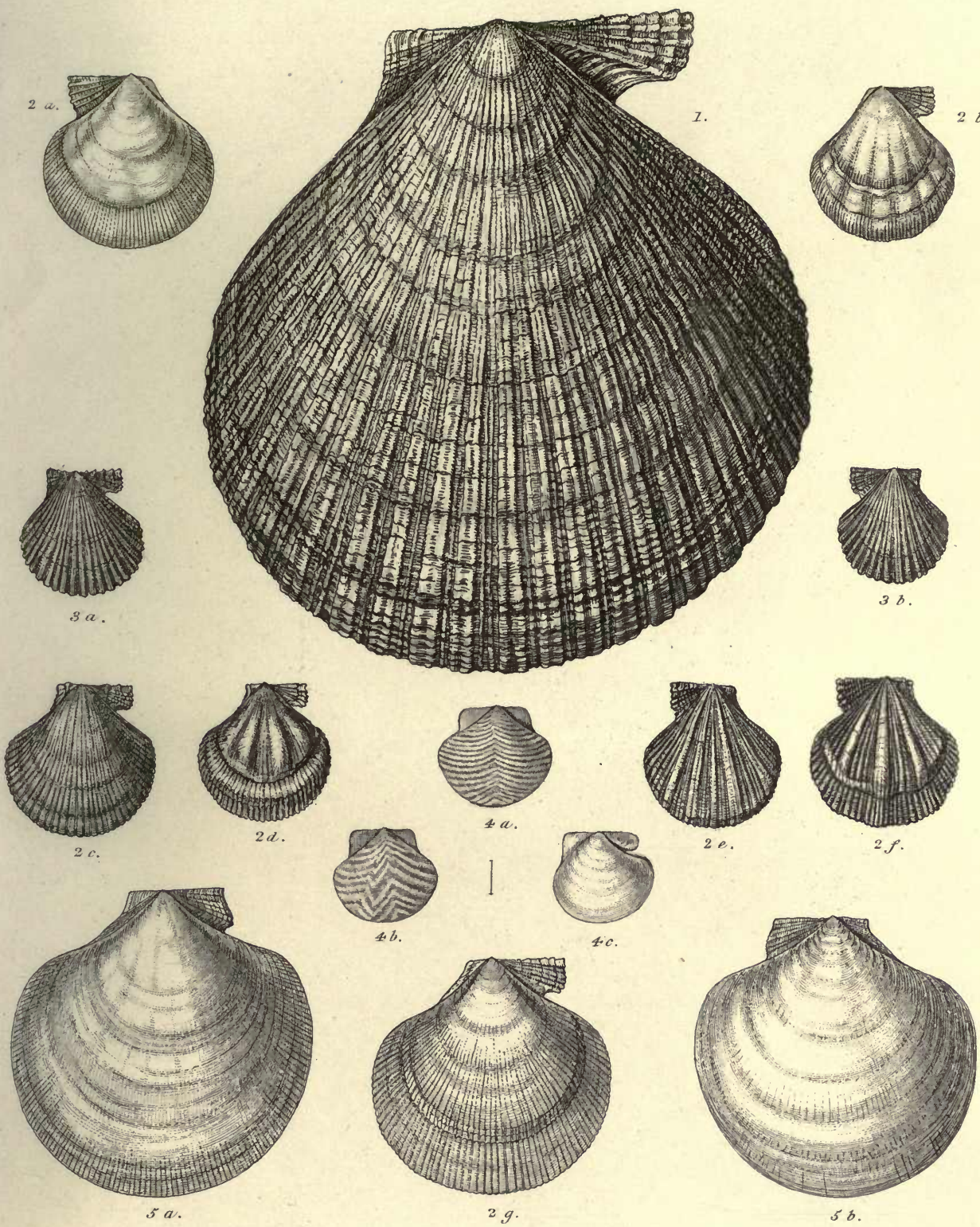
2. Pecten tigrinus, *p.* 27.
   - *a.* var. lævis, left valve, outside view.
   - *b.* „ δ. right valve, ditto.
   - *c.* „ β. right valve, ditto.
   - *d.* „ γ. right valve, ditto.
   - *f.* „ γ. left valve, ditto.
   - *e.* „ γ. id., showing a different mode of growth.
   - *g.* „ exoletus, right valve.

3. Pecten Bruei, *p.* 29.
   - *a.* right valve.
   - *b.* left valve.

4. Pecten similis, *p.* 25.
   - *a.* left valve, with a single divergence of coloured lines.
   - *b.* id., with zigzag lines.
   - *c.* right valve.

5. Pecten Gerardii, *p.* 24.
   - *a.* right valve.
   - *b.* left valve.

The lines indicate the size of the specimens.


2 a.
1.
2 b
3 a.
3 b.
2 c.
2 d.
4 a.
2 e.
2 f.
4 b.
4 c.
5 a.
2 g.
5 b.

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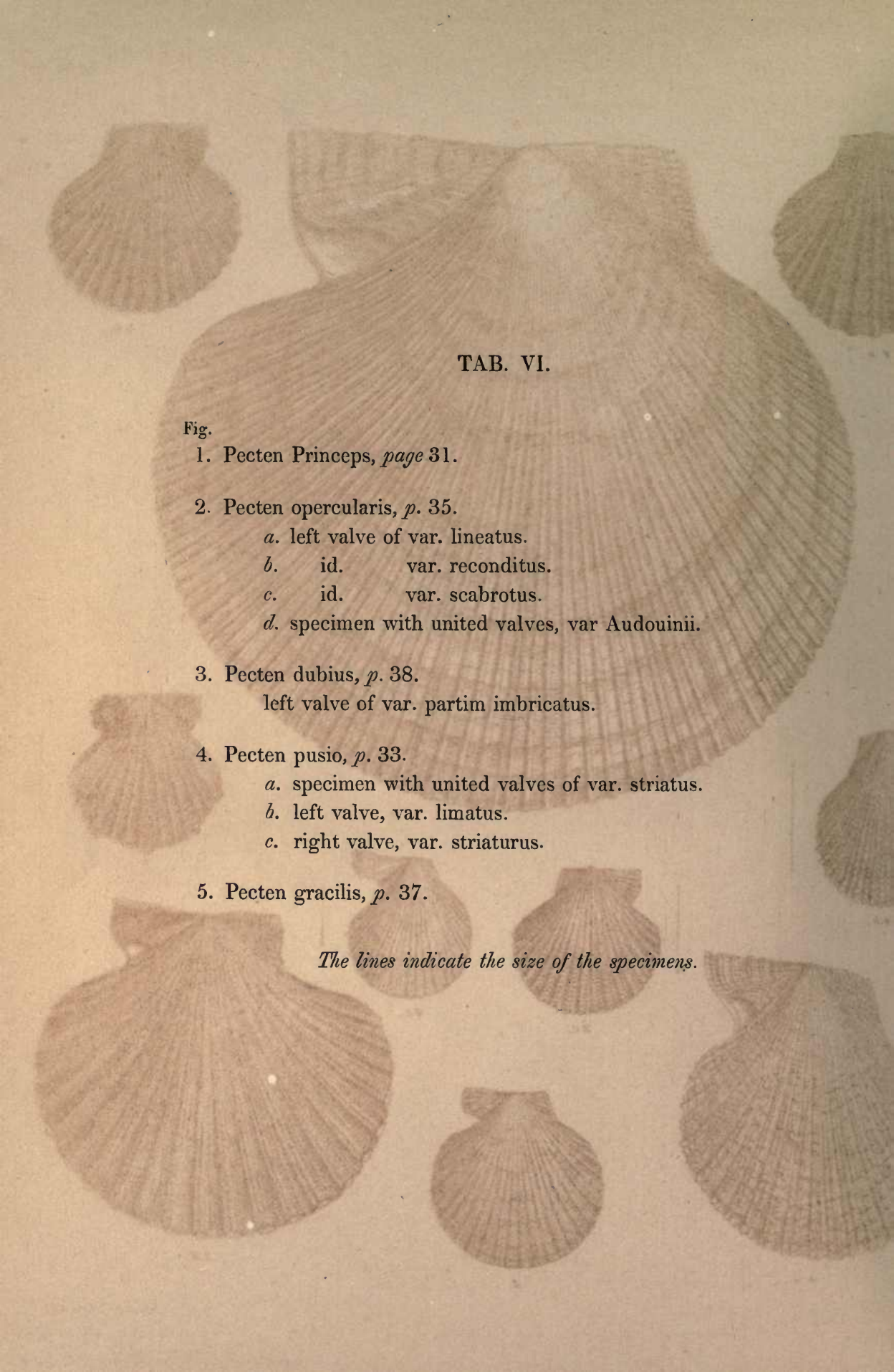


TAB. VI.

Fig.

1. Pecten Princeps, *page* 31.

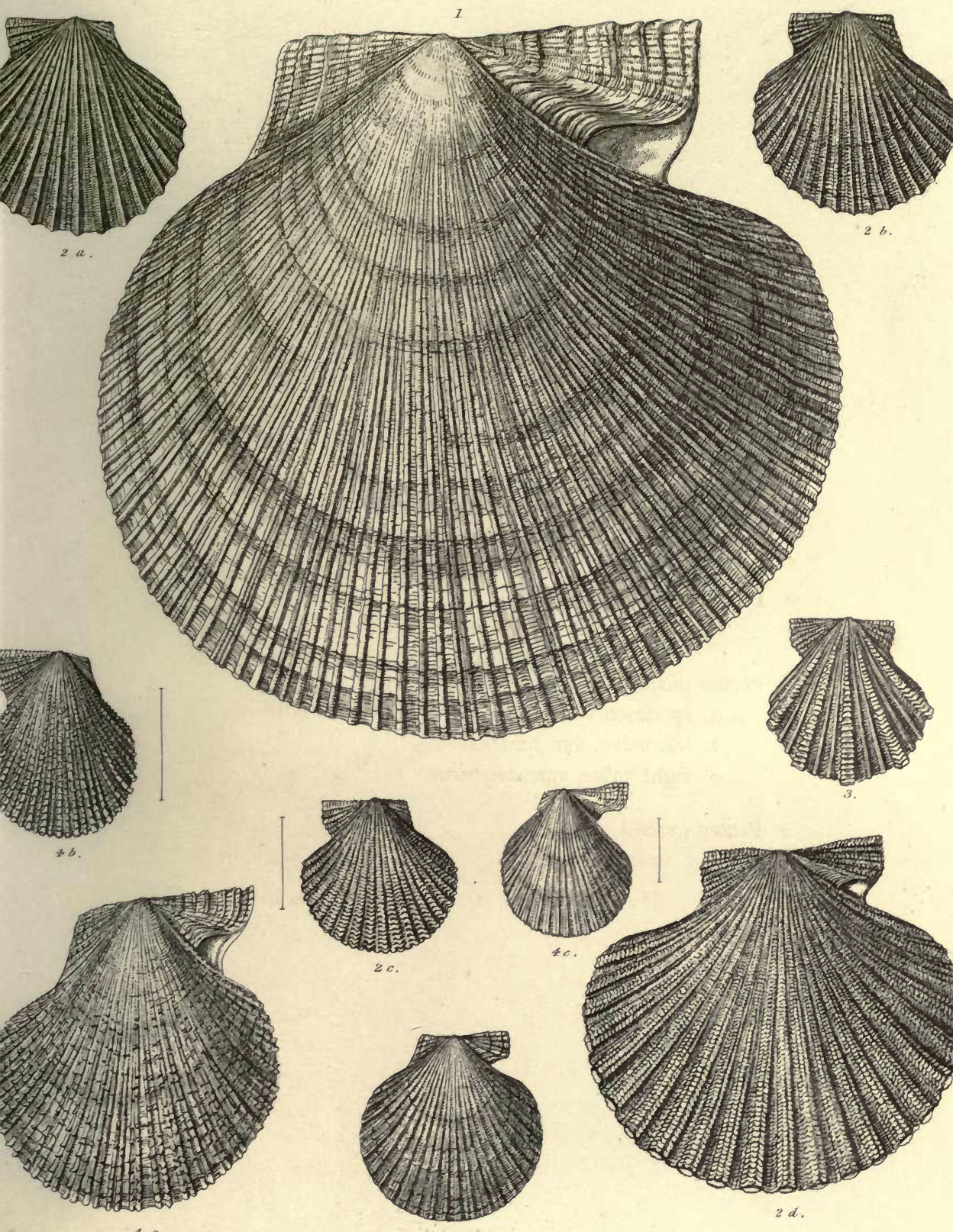
2. Pecten opercularis, *p.* 35.
   - *a.* left valve of var. lineatus.
   - *b.* id. var. reconditus.
   - *c.* id. var. scabrotus.
   - *d.* specimen with united valves, var Audouinii.

3. Pecten dubius, *p.* 38.
   left valve of var. partim imbricatus.

4. Pecten pusio, *p.* 33.
   - *a.* specimen with united valves of var. striatus.
   - *b.* left valve, var. limatus.
   - *c.* right valve, var. striaturus.

5. Pecten gracilis, *p.* 37.

The lines indicate the size of the specimens.



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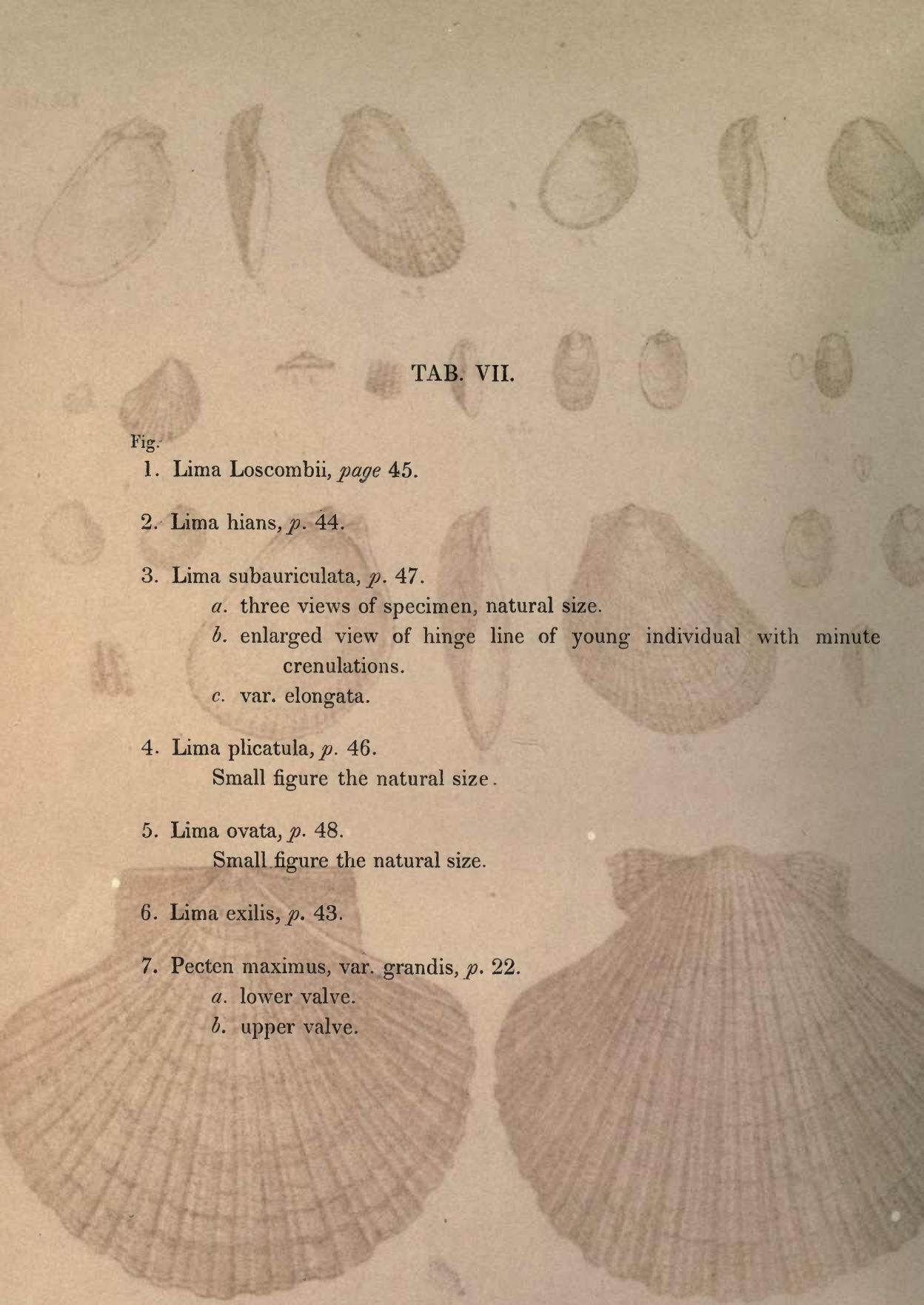


TAB. VII.

Fig.

1. Lima Loscombii, *page* 45.

2. Lima hians, *p.* 44.

3. Lima subauriculata, *p.* 47.
   - *a.* three views of specimen, natural size.
   - *b.* enlarged view of hinge line of young individual with minute crenulations.
   - *c.* var. elongata.

4. Lima plicatula, *p.* 46.
   Small figure the natural size.

5. Lima ovata, *p.* 48.
   Small figure the natural size.

6. Lima exilis, *p.* 43.

7. Pecten maximus, var. grandis, *p.* 22.
   - *a.* lower valve.
   - *b.* upper valve.

1.a

1.b

1.c

2.a

2.b

2.c

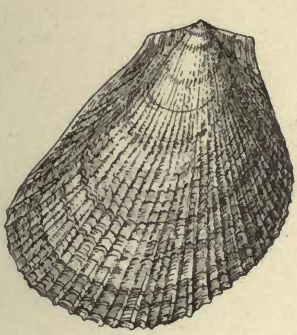
3.c

3.a

3.b

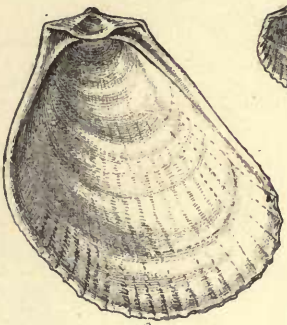
4

5

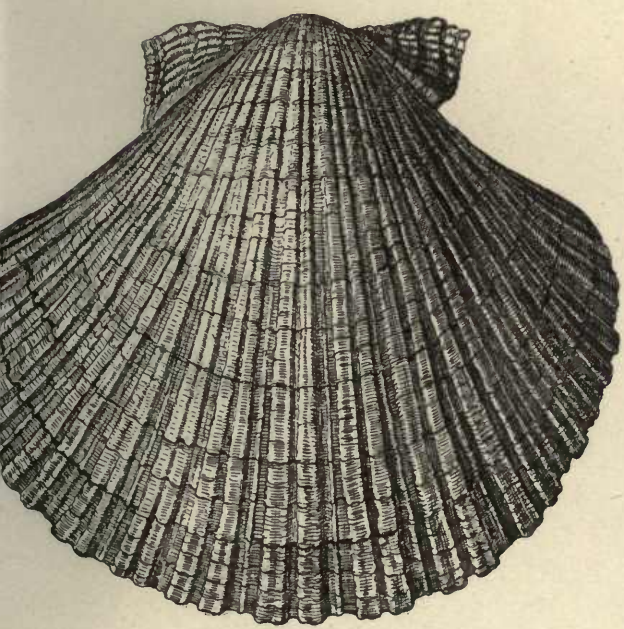


6.a

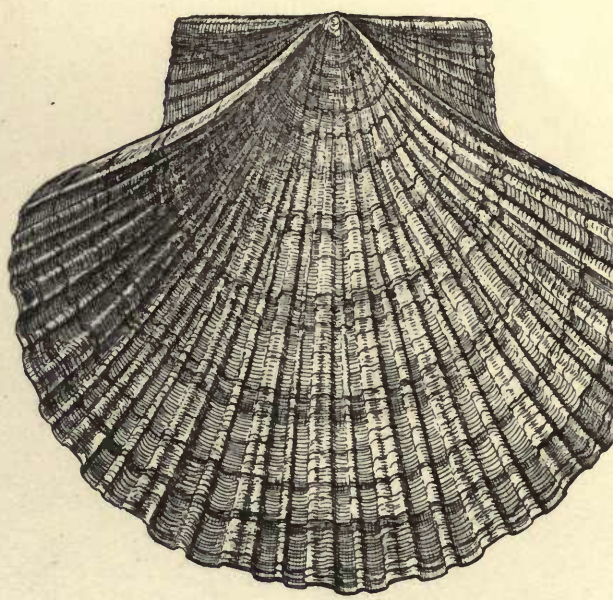
6.b



6.c



7.a



7.b

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TAB. VIII.

Fig.

1. Modiola modiolus, *page* 57.
   - *a.* outside view of var. vulgaris.
   - *b.* inside ditto.
   - *c.* inside ditto, elongated var.

2. Modiola barbata, *p.* 58.

3. Modiola sericea, *p.* 61.

4. Modiola phaseolina, *p.* 59.
   - *c.* inside view of young specimen, showing a crenulated margi

5. Modiola discors, *p.* 60.

6. Modiola costulata, *p.* 60.
   - *a.* outside view of elongated var.
   - *b.* inside ditto var. Petagnæ.

7. Modiola marmorata, *p.* 62.

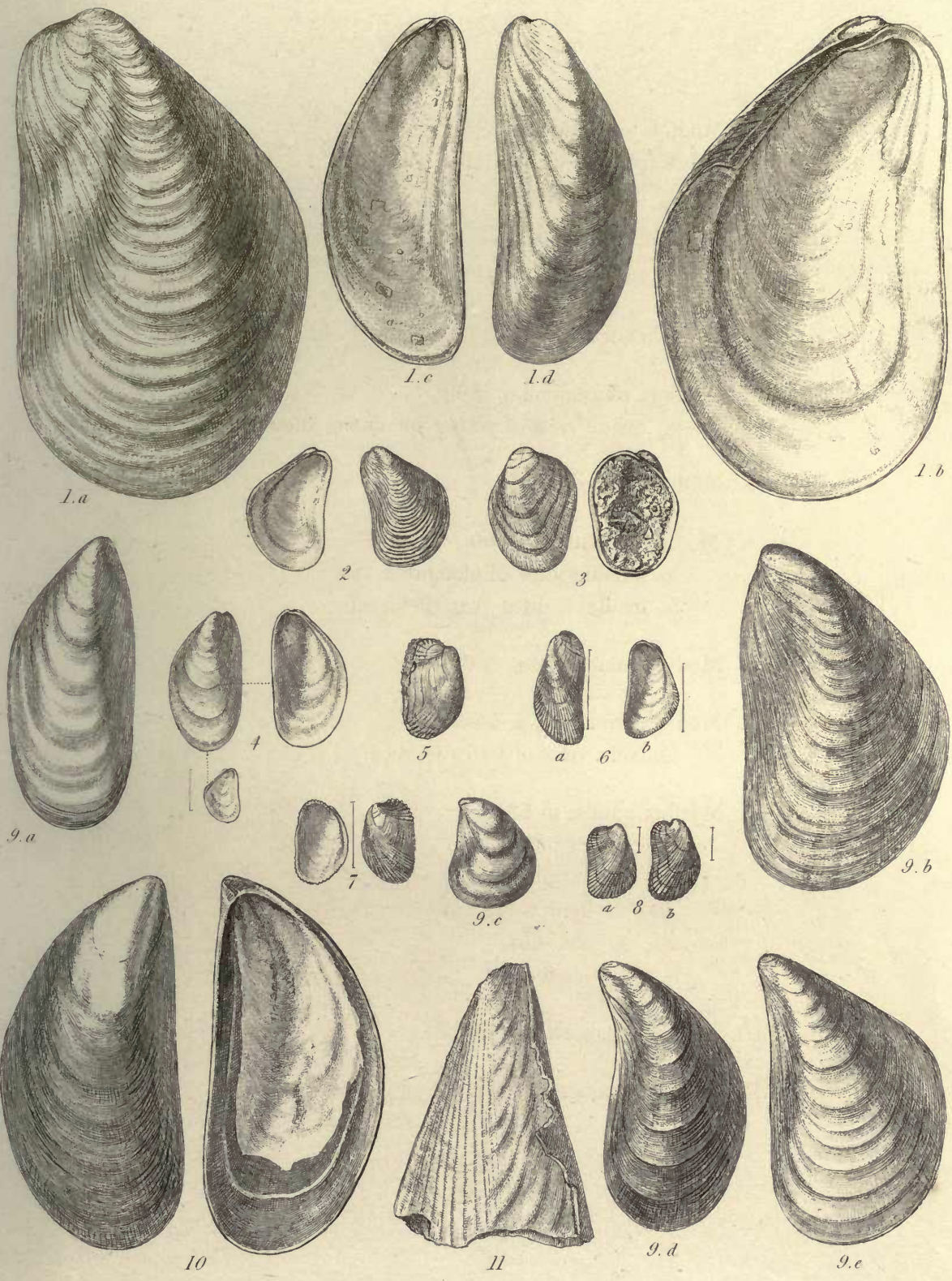
8. Modiola rhombea, *p.* 64.
   Outside view of two varieties.

9. Mytilus edulis, *p.* 52.
   - *a.* var. elegans.
   - *b.* „ antiquorum.
   - *c.* „ incurvatus.
   - *d.* „ saxatilis.
   - *e.* „ alæformis.

10. Mytilus hesperianus, *p.* 55.

11. Pinna pectinata, *p.* 50.

The lines indicate the size of the specimens.



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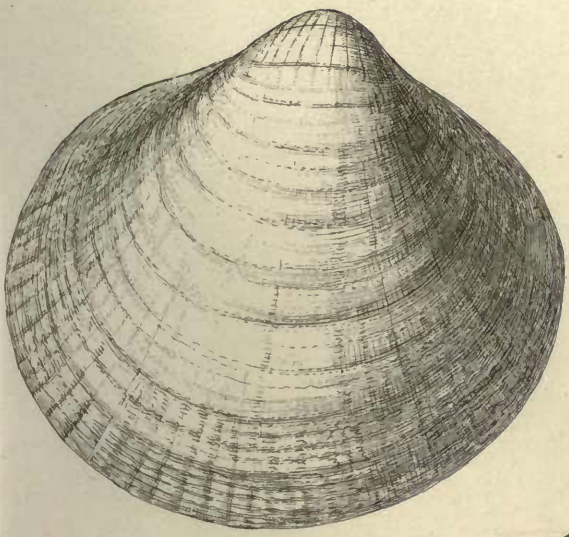
TAB. IX.

Fig.

1. Pectunculus glycimeris, *page* 66.
   - *a.* outside view of transverse var.
   - *b.* inside ditto of ditto
   - *c.* hinge line of antiquated specimen, showing the obliteration of denticles by the advance of the ligament.
   - *d.* outside of elongated var.
   - *e.* magnified view of the young shell showing one tooth only, on each side of the dental area.
   - *f.* outside view of a young specimen, with distinct and elevated costæ.
   - *g.* hinge with full complement of teeth.
   - *h.* inside view of var. subobliquus.
   - *i.* outside ditto of ditto.

2. Limopsis aurita, *p.* 70.
   - *c.* var. β.

3. Limopsis pygmæa, *p.* 71.
   - *c.* hinge magnified.



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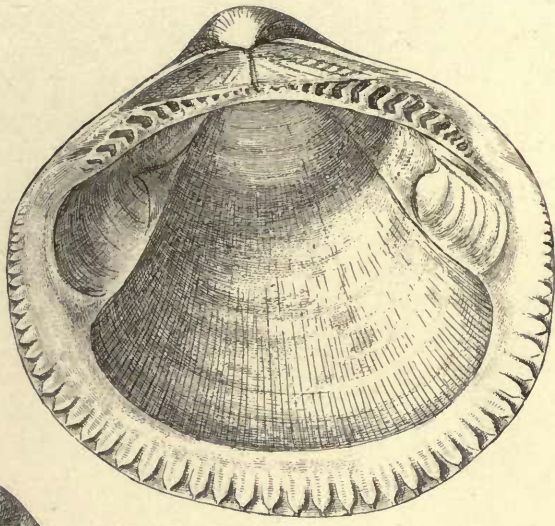
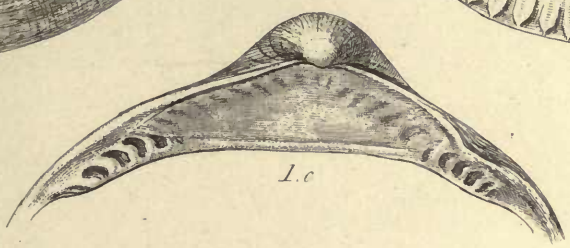


1.b

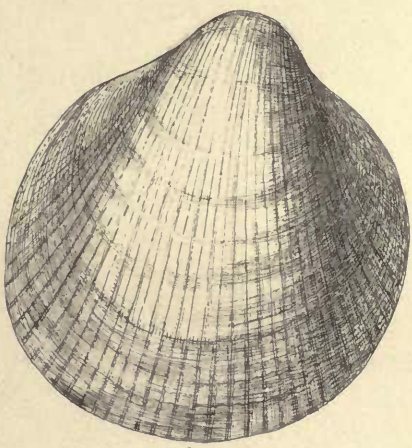


1.c

1.g

2

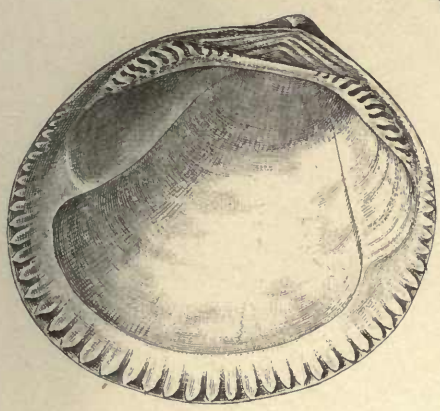
2.a



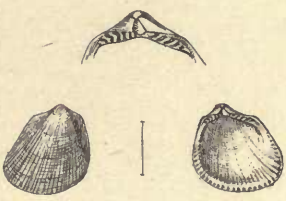
1.d

1.e

1.f



1.h



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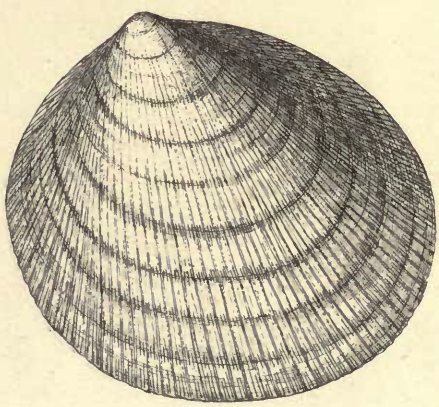

1.i

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TAB. X.

Fig.

1. Arca tetragona, *page* 76.
   - *a.* outside view of specimen from Red Crag.
   - *b.* inside view of the same.
   - *c.* outside of abraded specimen, with a sinuated form of ventral margin (Bissoarca).
   - *d.* inside of var. Britannica.

2. Arca lactea, *p.* 78.
   - *a.* outside, left valve.
   - *b.* inside of the same.

3. Arca pectunculoides, *p.* 79.
   - *a.* outside of var. brevis.
   - *b.* inside of var. elongata.

4. Nucinella miliaris, *p.* 73.
   - *a.* inside of right valve.
   - *b.* inside of left valve.
   - *c.* united valves, showing the position of the ligament.

5. Nucula tenuis, *p.* 84.

6. Nucula nucleus, *p.* 85.

Fig.

7. Nucula trigonula, *p.* 86.

8. Nucula lævigata, *p.* 81.

9. Nucula Cobboldiæ, *p.* 82.

10. Leda semistriata, *p.* 91.

11. Leda pygmæa, *p.* 95.
   - *a.* inside view of an acuminated specimen.
   - *b.* outside of a specimen of a more rounded form.

12. Leda caudata, *p.* 92.

13. Leda pernula, *p.* 93.

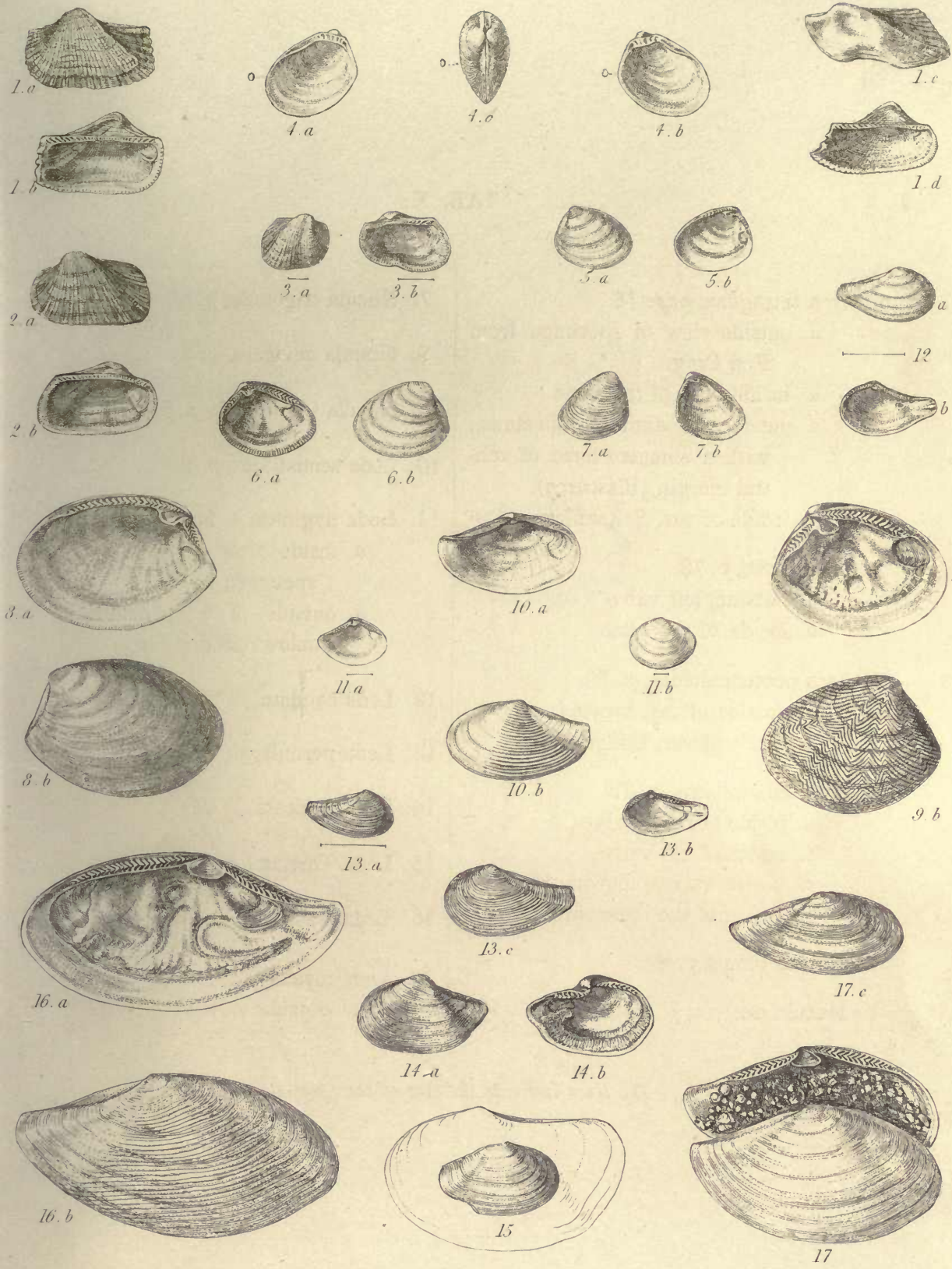
14. Leda truncata, *p.* 94.

15. Leda Thraciæformis, *p.* 96.

16. Leda lanceolata, *p.* 88.

17. Leda myalis, *p.* 90.
   - *c.* outside view of elongated var.

The lines indicate the size of the specimens.



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TAB. XI.

Fig.

1. Pisidium amnicum, *page* 109.
   - *a.* inside of elongated specimen from Stutton.
   - *b.* ditto of var. sulcatum from Grays.

2. Cyclas cornea, *p.* 107.
   - *a.* outside of var. tumida.
   - *b.* ditto of var. compressa.

3. Montacuta donacina, *p.* 131.
   - *b.* inside of left valve.
   - *c.* outside of the same.
   - *a.* inside of var. cylindrica.

4. Kellia cycladia, *p.* 122.

5. Cyamium? eximium, *p.* 132.

6. Lepton depressum, *p.* 116.

Fig.

7. Lepton nitidum, *p.* 116.

8. Lepton squamosum, *p.* 114.

9. Lepton deltoideum, *p.* 115.
   - *c.* hinge of left valve slightly enlarged.
   - *d.* ditto right valve ditto.

10. Kellia rubra, *p.* 125.

11. Anodonta cygnea, *p.* 102.

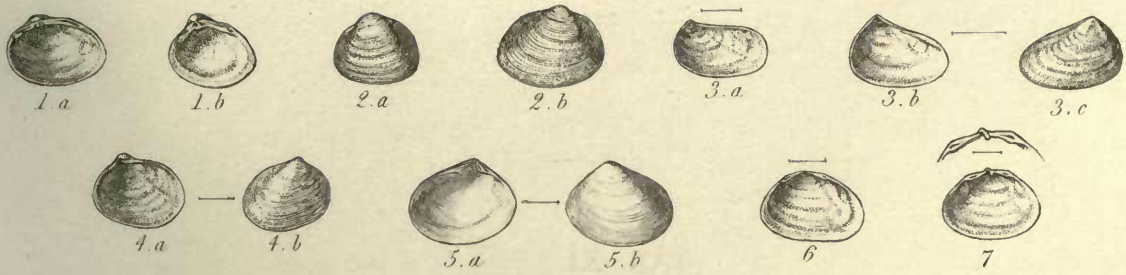
12. Unio littoralis, *p.* 98.

13. Unio tumidus, *p.* 99.

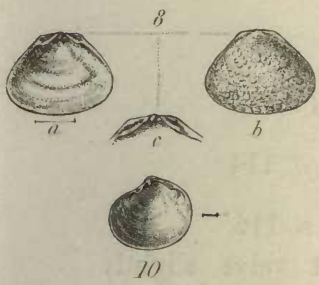
14. Lucinopsis Lajonkairii, *p.* 149.

15. Cyrena consobrina, *p.* 104.
   - *c.* specimen of a more trigonal form.

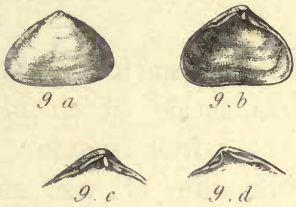
The lines indicate the size of the specimens.


1.a 1.b 2.a 2.b 3.a 3.b 3.c

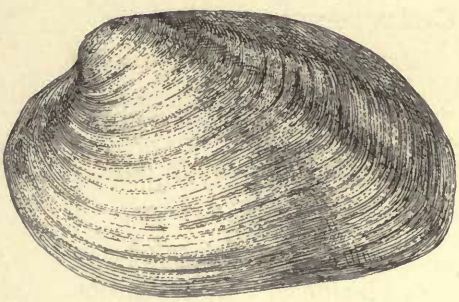
4.a 4.b 5.a 5.b 6 7


8 a c b 10

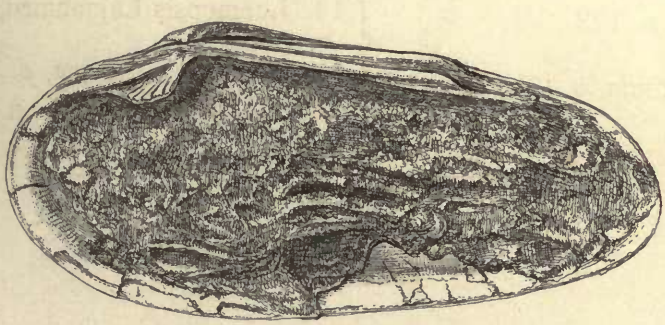
11


9.a 9.b 9.c 9.d

12.a


12.b

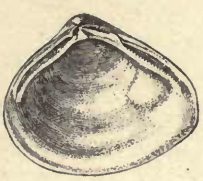
14.a


13

15.c

14.b

14.c


15.a

15.b

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TAB. XII.

Fig.

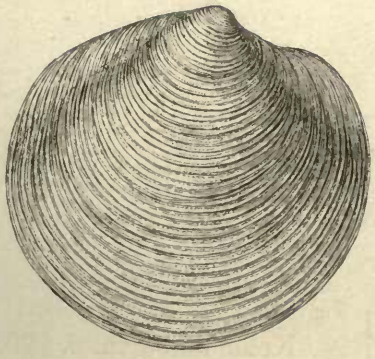
1. Lucina borealis, *page* 139.
2. Diplodonta astartea, *p.* 146.
3. Diplodonta rotundata, *p.* 144.
4. Loripes divaricata, *p.* 137.
5. Diplodonta dilatata, *p.* 145.
6. Lucina decorata, *p.* 141.
7. Lucina crenulata, *p.* 140.
8. Kellia suborbicularis, *p.* 118.
   a. orbicular variety, left valve.
   b. transverse ditto, right valve.
9. Kellia orbicularis, *p.* 120.
   a, *b.* interiors of both valves magnified.
   c. outside view, natural size.
10. Kellia coarctata, *p.* 123.

Fig.

11. Kellia ambigua, *p.* 120.
    a. trigonal variety.
    b. elliptical ditto.
12. Montacuta substriata, *p.* 128.
13. Kellia elliptica, *p.* 121.
    b. united valves, showing the sinuated form of hinge margin.
14. Montacuta ferruginosa, *p.* 129.
15. Kellia pumila, *p.* 124.
16. Montacuta truncata, *p.* 127.
17. Montacuta bidentata, *p.* 126.
18. Hippagus verticordius, *p.* 150.
19. Cryptodon ferruginosum, *p.* 135.
20. Cryptodon sinuosum, *p.* 134.

The lines indicate the size of the specimens.

2



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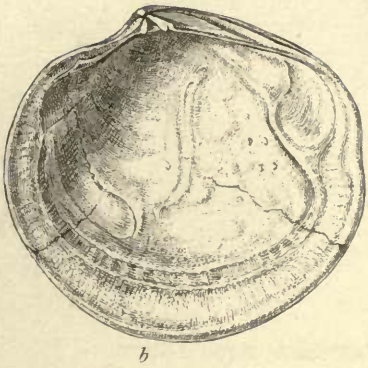

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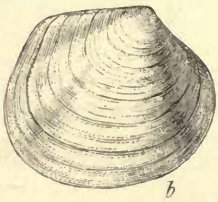

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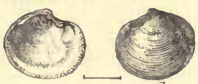
6



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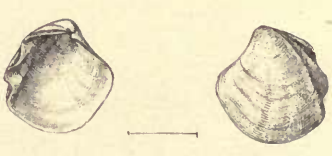

20

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TAB. XIII.

Fig.

1 *a*—*d*. Cardium Groenlandicum, *page* 160.

2 *a*, *b*. „ venustum, *p*. 160.

3 *a*, *b*. „ nodosulum, *p*. 154.

c. „ „ portion of surface magnified.

4 *a*, *b*. „ nodosum, *p*. 153.

c. „ „ portion of surface magnified.

5 *a*, *b*. „ strigilliferum, *p*. 154.

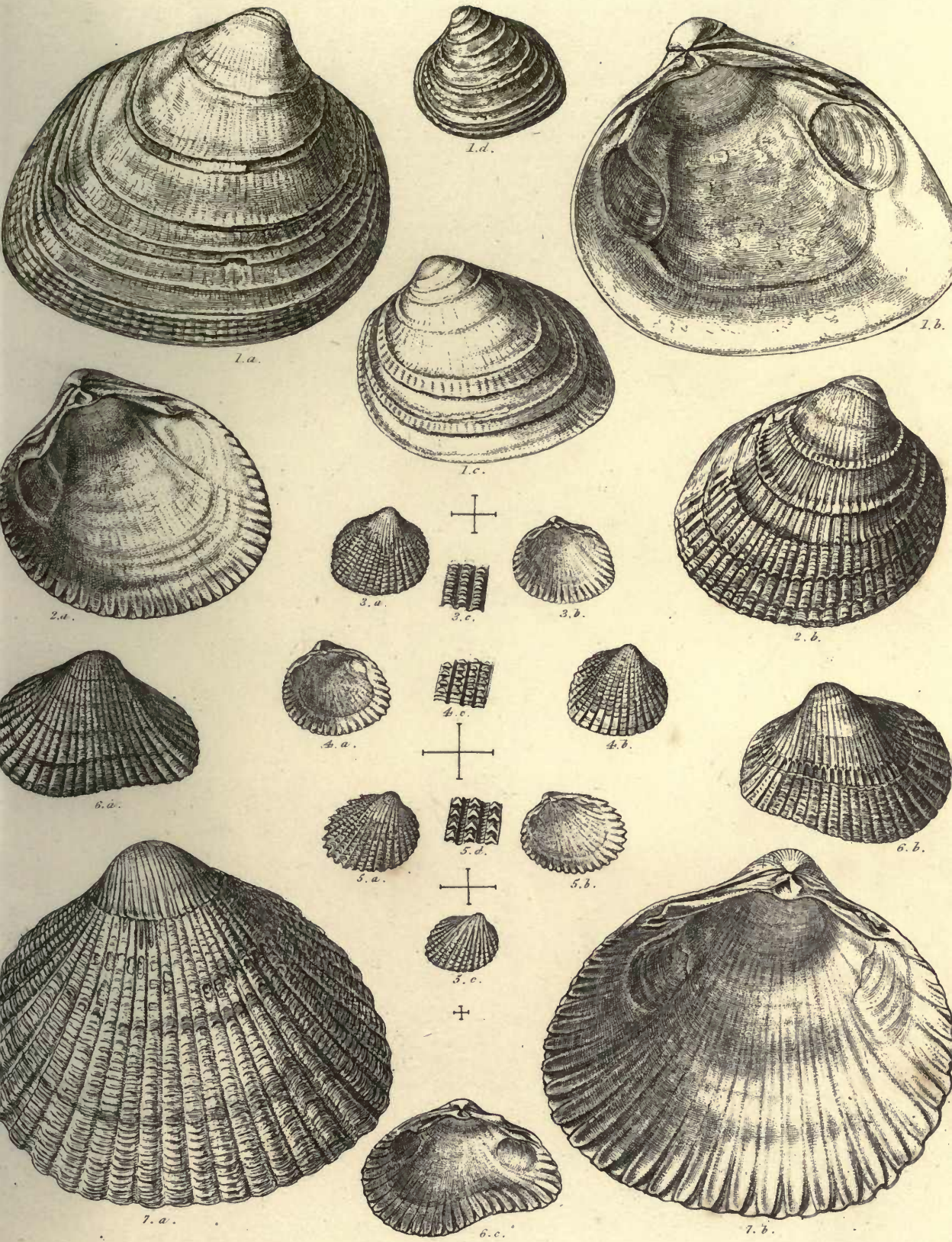
d. „ „ portion of surface magnified.

c. „ „ young specimen, showing the introduction of an intermediate ray.

6 *a*—*c*. „ angustatum, *p*. 157.

7 *a*, *b*. „ Parkinsoni, *p*. 158.

The lines indicate the size of the specimens.



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TAB. XIV.

Fig.

1 *a*—*c*. Cardium decorticatum, *page* 159.

d. „ „ (tenellum)

2 *a*—*g*. „ edule, *p*. 155.

a. Var. vulgaris.

b. „ umbonatum, from Bramerton, Mam. Crag.

c. „ edulinum, from Sutton, Cor. Crag.

d. „ multicostatum, with 28 ribs; from Sutton, Red Crag.

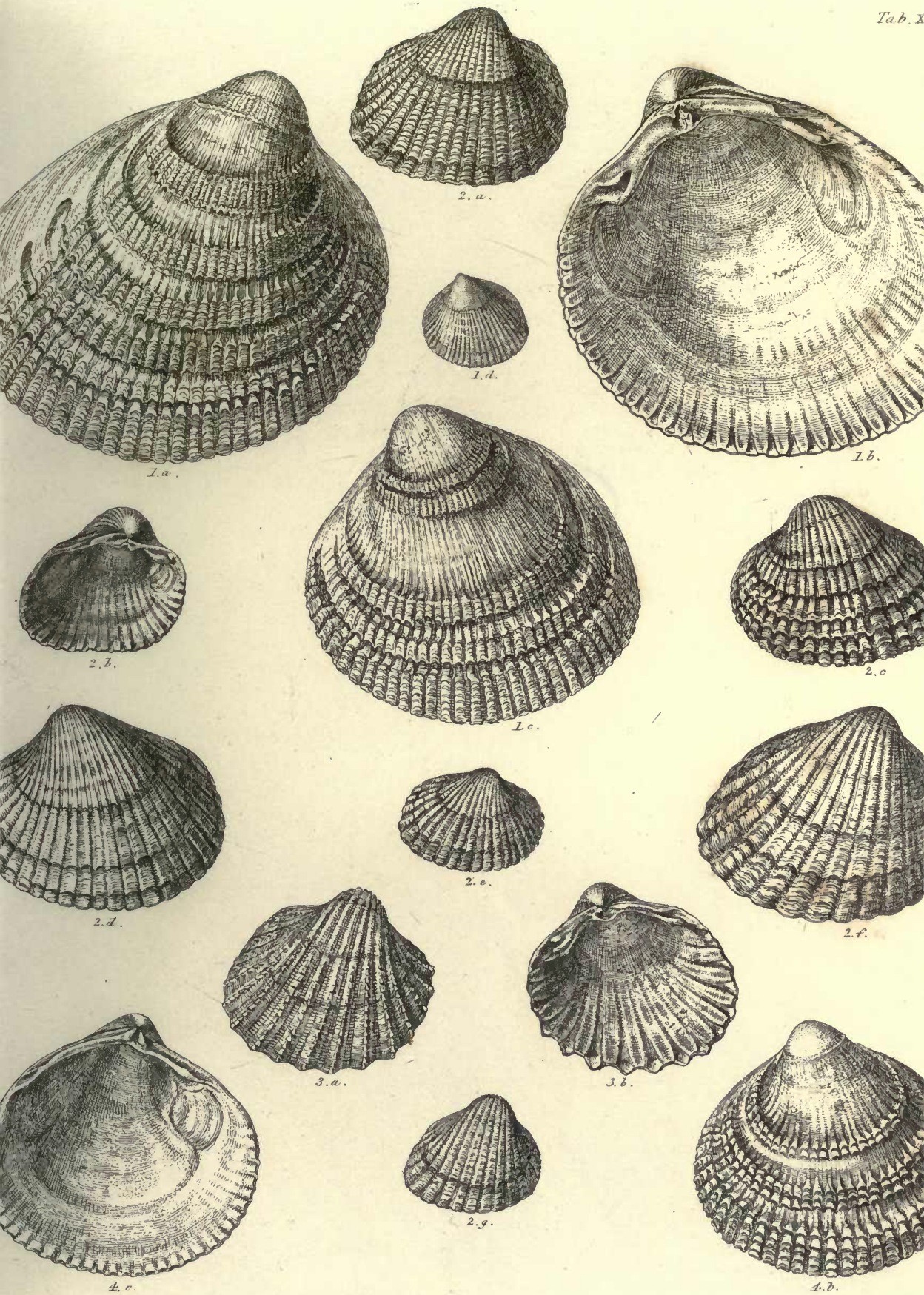
e. „ clodiense, from Sutton, Red Crag.

f. „ inhabile, with 20 ribs; from Sutton, Red Crag.

g. „ paucicostatum, 18 ribs; Bramerton, Mam. Crag.

3 *a*, *b*. Cardium echinatum, *p*. 152.

4 *a*, *b*. „ interruptum, *p*. 159.



1.a.
2.a.
1.b.
1.d.
2.b.
1.c.
2.c
2.d.
2.e.
2.f.
3.a.
3.b.
2.g.
4.c.
4.b.

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TAB XV.

Fig.

1 *a—f.* Cardita senilis, *page* 165.

2 *a, b.* „ corbis, var. nuculina, *p.* 168.

c, d. „ „ „ exigua.

3 *a. b.* „ chamæformis, *p.* 167.

4. „ or bicularis, *p.* 167.

5. „ scalaris, *p.* 166.

6. „ analis, *p.* 168.

7 *a—d.* Coralliophaga cyprinoides, *p.* 200.

b, c. „ „ var. elongata.

d. „ „ slightly enlarged view of the hinge.

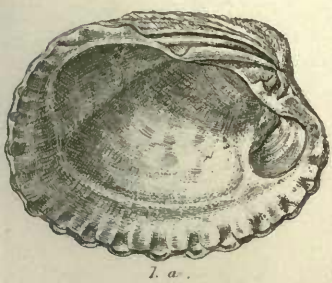
8 *a—d.* Chama gryphoides, *p.* 162.

9 *a, b.* Isocardia cor, *p.* 193.

10 *a—d.* Erycinella ovalis, *p.* 171.

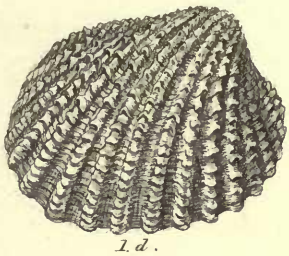
e, f. Enl arged views of the hinge, showing a central cavity of the ligament.

The lines indicate the size of the specimens.


1. a.

1. b.

1. c.


1. d.

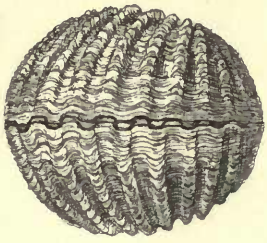
1. e.

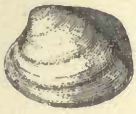
2. a.

2. b.

2. c.

2. d.


1. f.


7. a.

7. d.

7. b.

7. c.

3. a.

3. b.

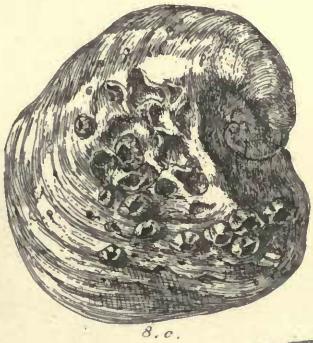
4.

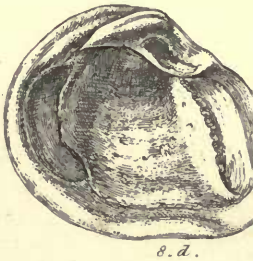
5.

6.

8. a.

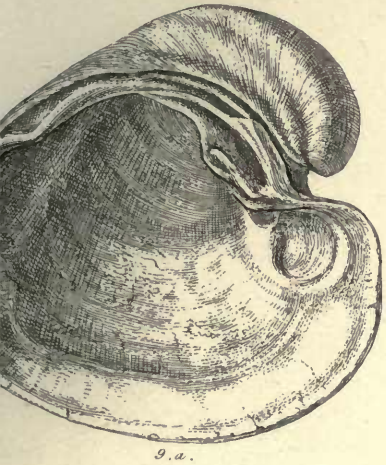
8. b.


8. c.


8. d.

10. e.

10. f.

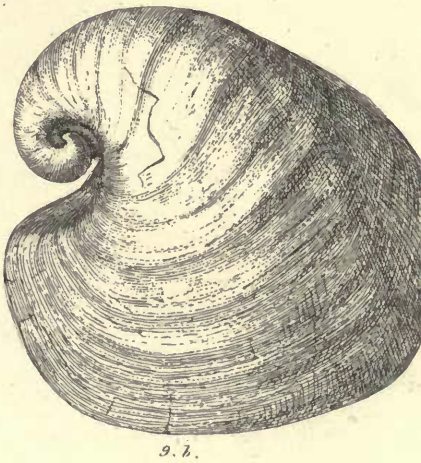

9. a.

10. c

10. d.

10. a.

10. b.


9. b.

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TAB. XVI.

Fig.

1 *a—f.* Astarte mutabilis, *page* 179.

c, d. „ „ var. deformis.

e, f. „ „ specimen from Bridlington.

2 *a, b.* „ crebrilirata, *p.* 184.

3 *a—d.* „ borealis, *p.* 175.

c, d. „ „ var. Withami.

4 *a—d.* „ obliquata, *p.* 189.

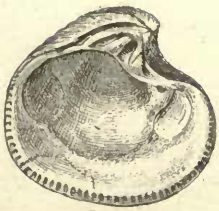
5 *a, b.* „ sulcata, *p.* 182.

6 *a, b.* „ incrassata, *p.* 178.

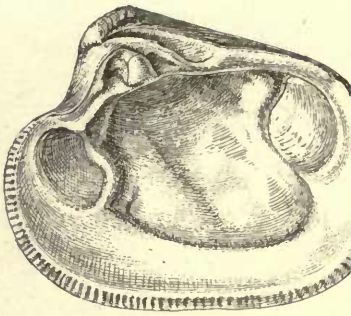
7 „ elliptica, *p.* 181.

8 *a—c.* „ compressa, *p.* 183.

1. a



1. c

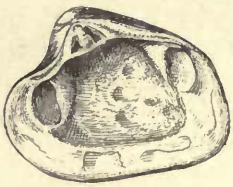


1. b

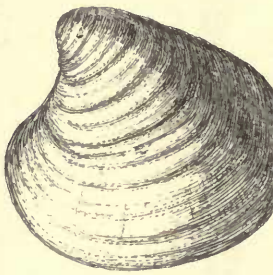
1. d

1. g

1. e



1. f

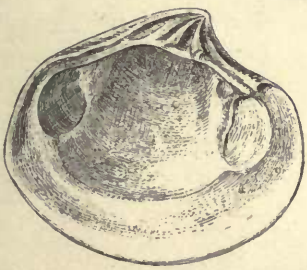


1. h

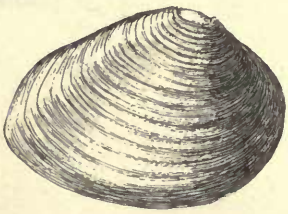
2. a

2. b

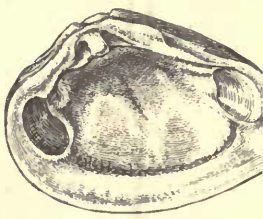
3. a



3. b



3. c



3. d

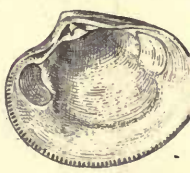
5. a

4. a

4. b

f. 5. b

4. c



4. d

6. a

6. b

7.

8. a

8. b

8. c

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TAB. XVII.

Fig.

1 *a—f.* Astarte Omalii, *p.* 180.

c. „ „ var. undulata.

d. „ „ „ bipartita.

e. „ „ „ acuminata.

f. „ „ „ elliptica.

2 *a—d.* „ Basterotii, *p.* 177.

3 *a—e.* „ gracilis, *p.* 185.

e. „ „ var. multilineata.

4. „ incerta, *p.* 186.

5 *a—d.* „ Burtinii, *p.* 188.

6. „ crebricostata? *p.* 186.

7 *a, b.* „ pygmæa, *p.* 187.

8 *a—d.* „ digitaria, *p.* 190.

9 *a, b.* „ excurrens, *p.* 191.

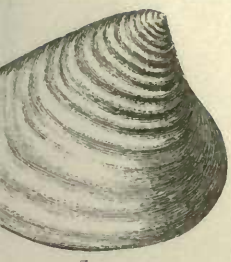
10 *a—d.* „ triangularis, *p.* 173.

a, b. „ „ var. trigona.

11 *a, b.* „ parvula, *p.* 175.

12 *a, b.* „ parva, *p.* 192.

The lines indicate the size of the specimens.


1. a

1. b

1. c

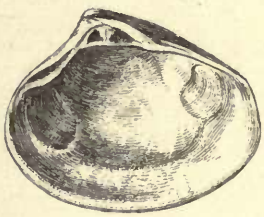
1. d

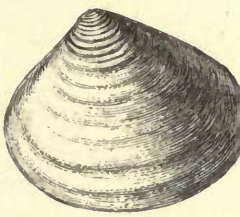
1. e

1. f

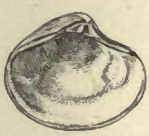
2. a

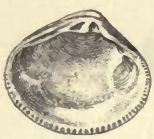
2. b


2. c


2. d

3. a


3. b

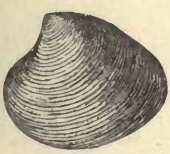

3. c

3. d

3. e

4.

5. a


5. b

5. c

5. d

6

7. a

7. b

8. a

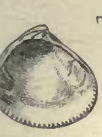
8. b

8. c

8. d

9. a

9. b


10. a

10. b

10. c

10. d

11. a

11. b

12. a

12. b

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TAB. XVIII.

Fig.

1 *a*—*e*. Cyprina rustica, *page* 197.

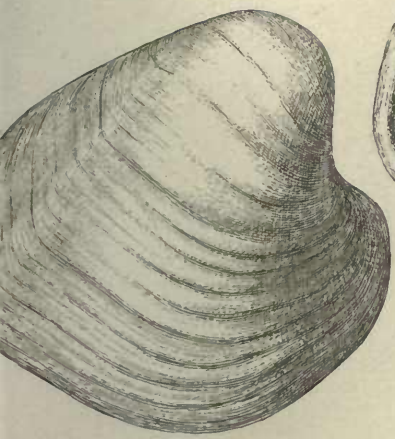
a, *c*, *e*. „ „ var. tumida.

b, *d*. „ „ „ elongata.

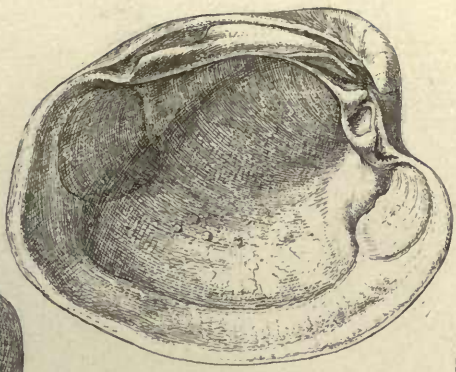
2 *a*—*d*. „ Islandica, *p*. 196.

c, *d*. „ „ var. orbicularis.

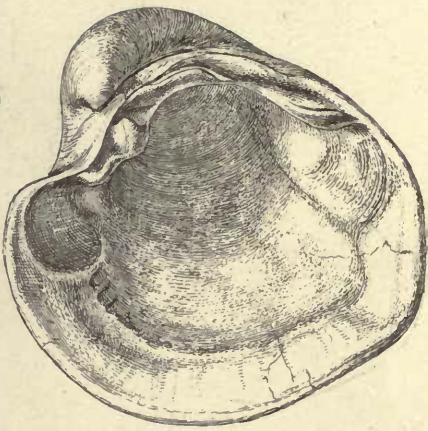
a, *b*. „ „ „ transversa.



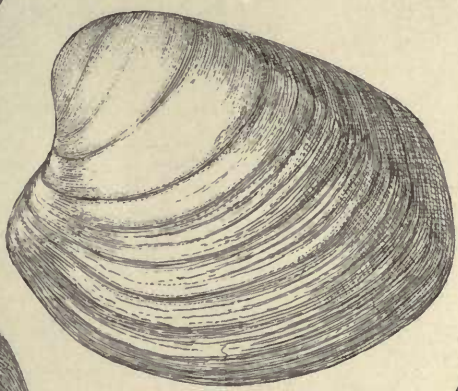
1. a



1 b



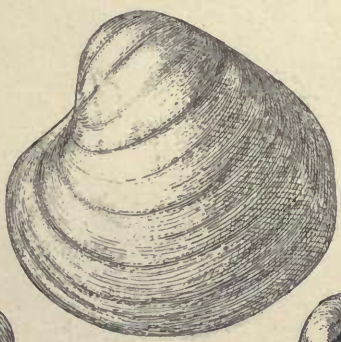
1. c



1. d

1. e

2. d



2. c

2. a

2. b

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TAB. XIX.

Fig.

1 *a—f.* Venus casina, *page* 210.

2 *a—d.* Circe minima, *p.* 198.

3 *a—f.* Venus imbricata, *p.* 212.

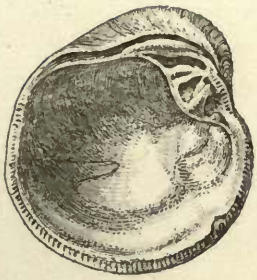
4 *a—d.* „ ovata, *p.* 213.

5 *a—c.* „ fasciata, *p.* 211.

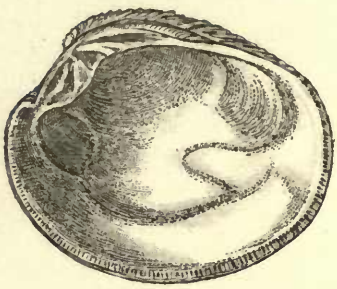
6 *a—b.* Venerupis irus, *p.* 205.

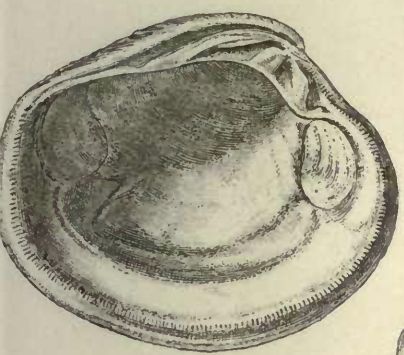
7 *a—d.* Tapes perovalis, *p.* 203.

1.a


1.b

1.c

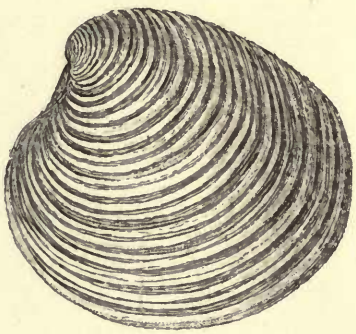

1.d


1.e

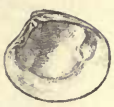
2.a

2.b

3.a


1.f

2.c


2.d

3.b

3.c

3.d

3.e

3.f

4.a

4.b

5.a

5.b

5.c

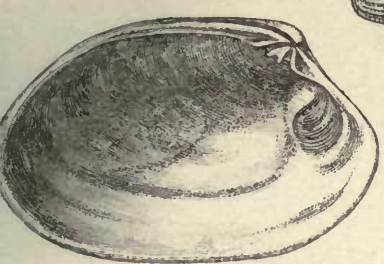
4.c

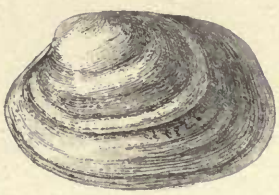
4.d

6.a

7.d

6.b


7.a


7.b

7.c

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TAB. XX.

Fig.

1 *a*—*e*. Tapes virginea, *page* 201.

c, *d*. „ „ from Mam. Crag, Bramerton.

e. View of sculpture, enlarged two fold.

2 *a*, *b*. Tapes aurea, *p*. 202.

3 *a*—*c*. „ texturata ? *p*. 204.

e. View of sculpture, enlarged two fold.

4 *a*, *b*. Cytherea chione, *p*. 207.

5 *a*—*d*. „ rudis, *p*. 208.

6 *a*—*d*. Artemis lincta, *p*. 215.

7 *a*—*c*. „ lentiformis, *p*. 215.

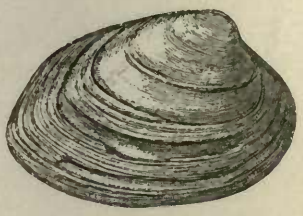
1.a

1.c

1.c

1.d

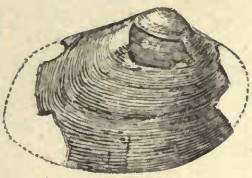
2.a



1.b

3.a

3.c

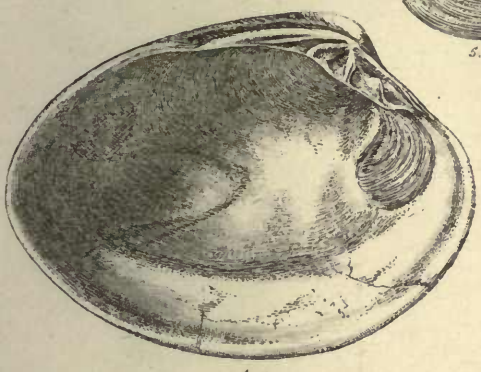


3.b

2.b

5.a

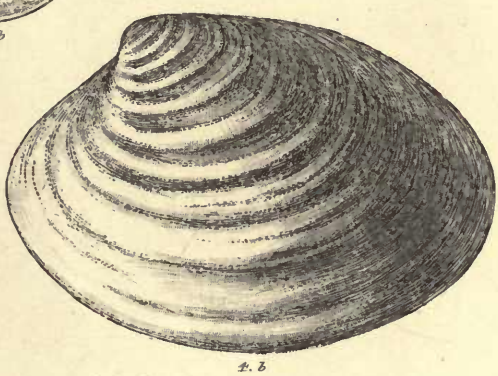
5.b



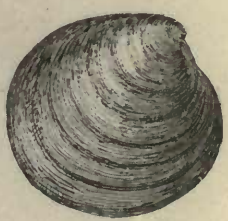
4.a

5.c

5.d

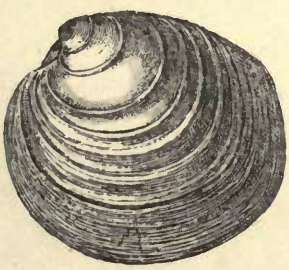


4.b



6.a

6.b

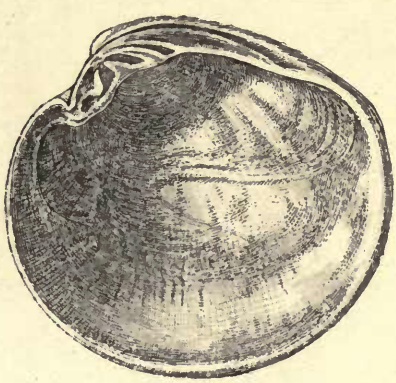


6.c

6.d

7.a.

7.c



7.b.

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TAB. XXI.

Fig.

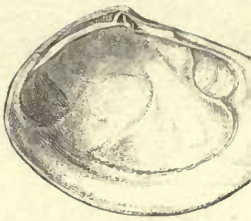
1. Tellina crassa, p. 226. From Red Crag, Sutton.
   e, portion of surface enlarged.
2. Tellina Benedenii, p. 230. From Red Crag, Sutton.
   a, *b*, show similarity of form in siphonal scar.
   d, shows the equal tumidity of the two valves.
   The siphonal side of fig. 2 *a*, was filled up by mistake; the specimen from which the figure was taken is imperfect, extending only to the fracture.
3. Tellina fabula, right valve, p. 232.
4. Tellina balaustina, p. 227. From Coralline Crag, Sutton.
   d, enlarged portion of surface.
5. Tellina prætenuis, p. 230. From Red Crag, Sutton.
6. Tellina lata, p. 228. „ „
7. Tellina obliqua, p. 228. „ „
   b, *c*, show the dissimilar forms of the siphonal scar.

Note. This plate was engraved March, 1854.

1.a

1.b

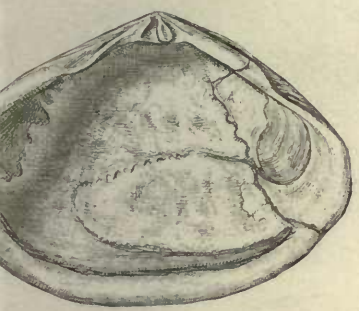
1.c


1.d

1.e

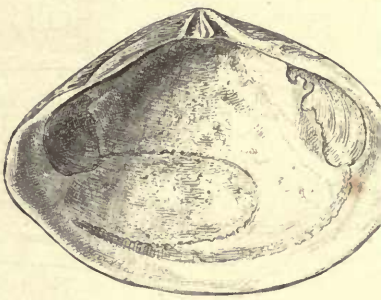
2.d

4.d


2.a

3

4.a

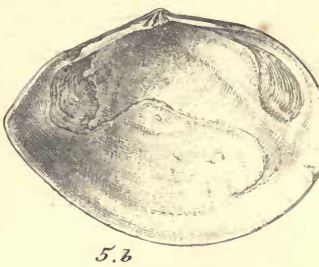

2.b

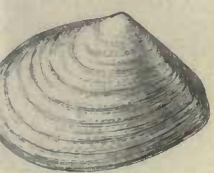
4.b

4.c

5.a

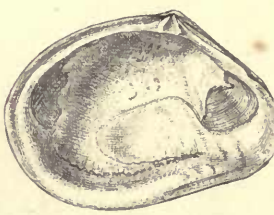
2.c


5.b


6.a

6.b

6.c

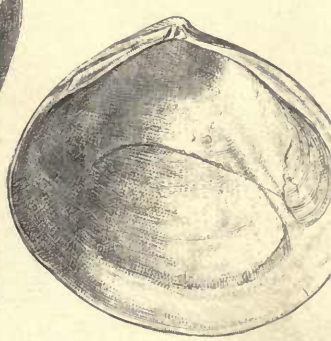

6.d

5.c

7.d

7.a

7.b


7.c

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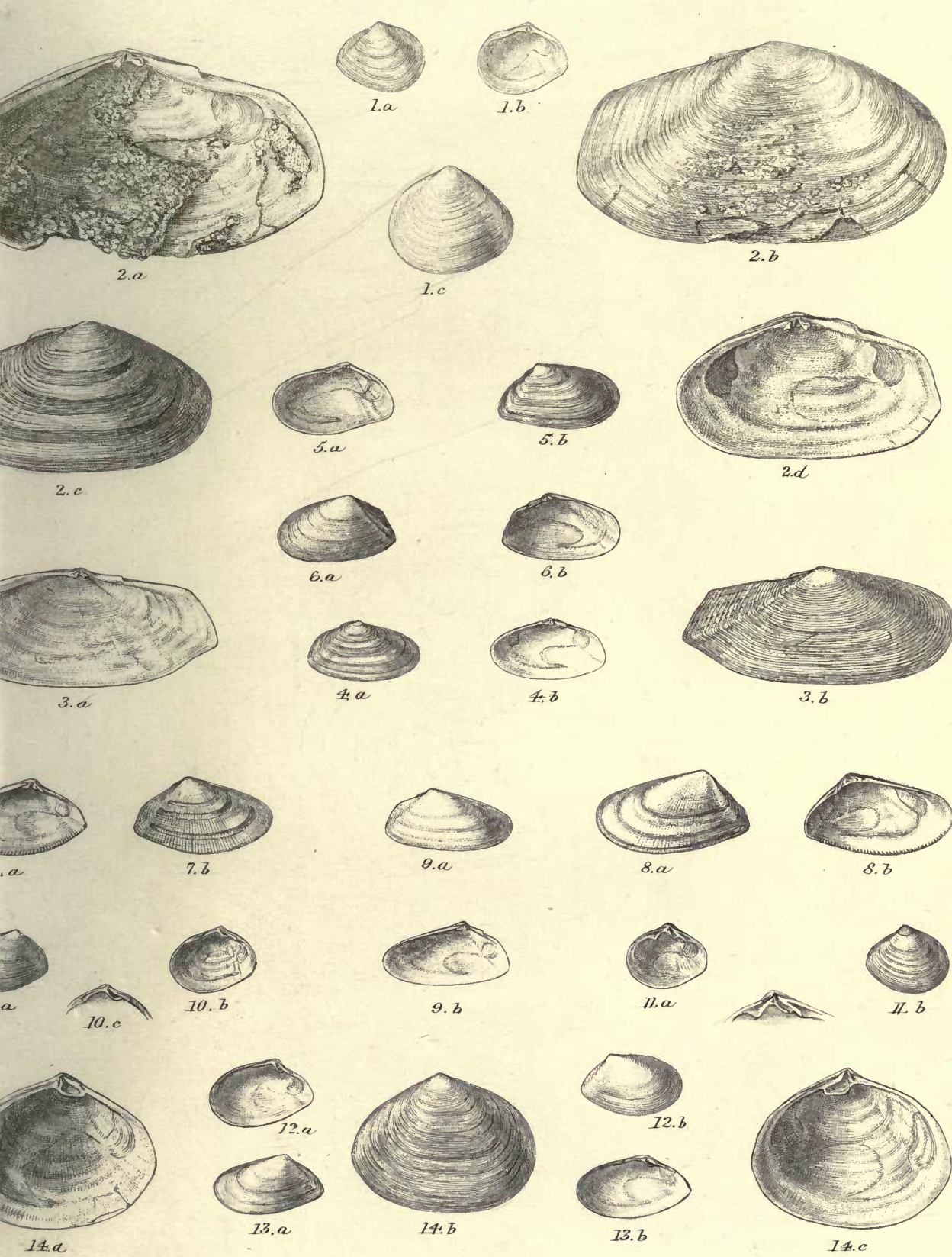
TAB. XXII.

Fig.

1. Tellina Balthica, p. 231.
   a, *b*, specimen from Clacton, found in clay, with Unio littoralis.
   c, specimen from Mam. Crag of Norfolk.
2. Psammobia vespertina, p. 222.
   a, *b*, representation of a monster valve from Sudbourne.
   c, *d*, specimen from Ramsholt.
3. Psammobia Ferröensis, p. 221. From Coralline Crag, Sutton.
4. Psammobia Tellinella, p. 223. „ „
5. Tellina donacina, p. 233. „ „
6. Tellina donacilla, p. 234. „ „
7. Donax vittatus, p. 219. From Mam. Crag, Bramerton.
8. Donax trunculus, p. 219. From Red Crag, Sutton.
9. Donax politus, p. 220. From Coralline Crag, Sutton.
10. Abra alba, p. 237. „ „
    c, enlarged hinge of right valve.
11. Abra obovalis, p. 240.
    c, enlarged hinge of right valve.
12. Abra fabalis, p. 238. From Red Crag, Walton Naze.
13. Abra prismatica, p. 239. From Coralline Crag, Sutton.
14. Trigonella plana, p. 235.
    a, *c*, show difference of form in palleal impression.



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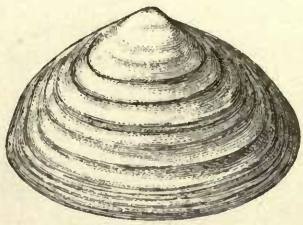
TAB. XXIII.

Fig.

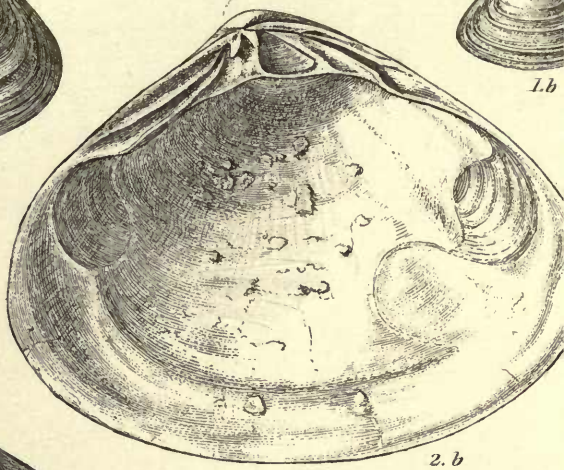
1. Mactra ovalis, p. 246.
   a, *b*, specimen from Mam. Crag, Chillesford.
   c, *d*, specimen from Red Crag, Sutton.
2. Mactra glauca, p. 241. From Red Crag, Newbourne.
3. Mactra stultorum, p. 242. „ Sutton.
4. Mactra artopta, p. 244. „ Sudbourne.
5. Mactra arcuata, p. 243.
   a, specimen from Ramsholt, Cor. Crag.
   b, *c*, specimen from Walton Naze, Red Crag.



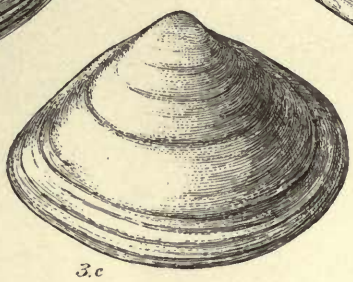
1.c

1.b

2.a

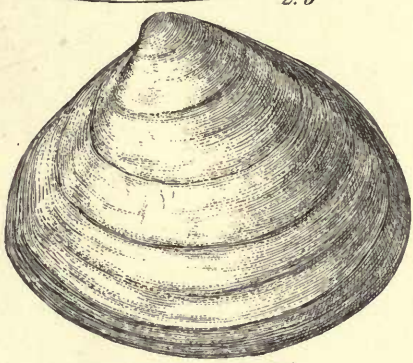


2.b

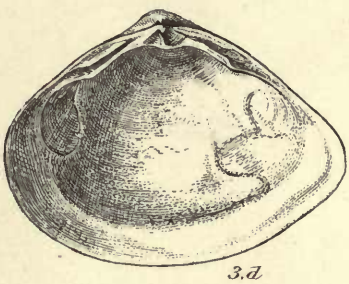


3.c

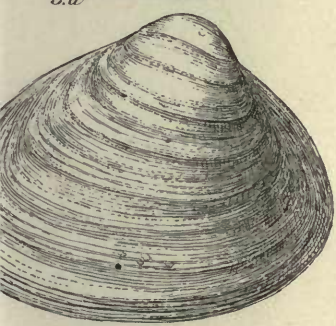
3.a



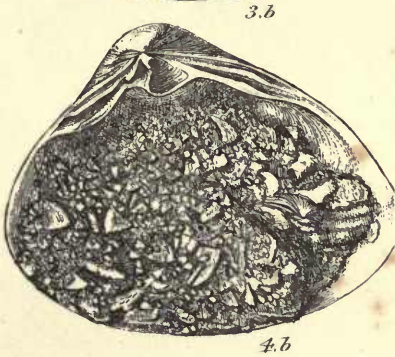
3.b



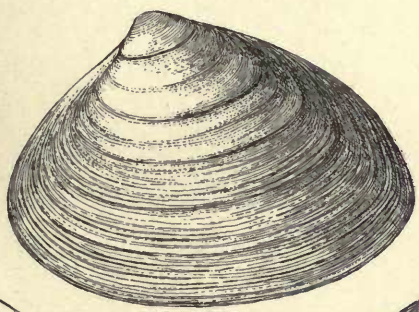
3.d



4.a

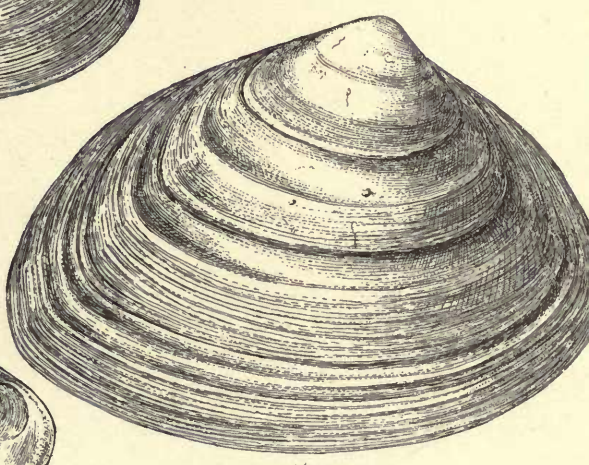


4.b



5.a

5.b



5.c

1.d

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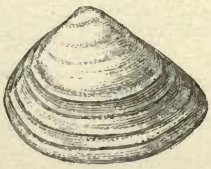
TAB. XXIV.

Fig.

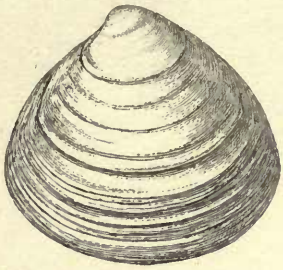
1. Lutraria elliptica, p. 251. From Coralline Crag, Ramsholt.
2. Mactra truncata, p. 245.
3. Mactra subtruncata, p. 247.
   a, specimen from Sutton.
   b, specimen from Bramerton.
4. Mactra solida, p. 245. From Red Crag, Sutton.
   c, a triangular variety probably of this species. It much resembles M. striata, *Smith*, 'Wern. Trans.,' vol. viii, pl. 1, fig. 22, but it has the two sides more equal.
5. Mactra obtruncata, p. 248. From Red Crag, Sutton.
6. Mactra constricta, p. 249. „ „
7. Mactra deaurata, p. 249.
8. Mactra procrassa, p. 244.

2.a

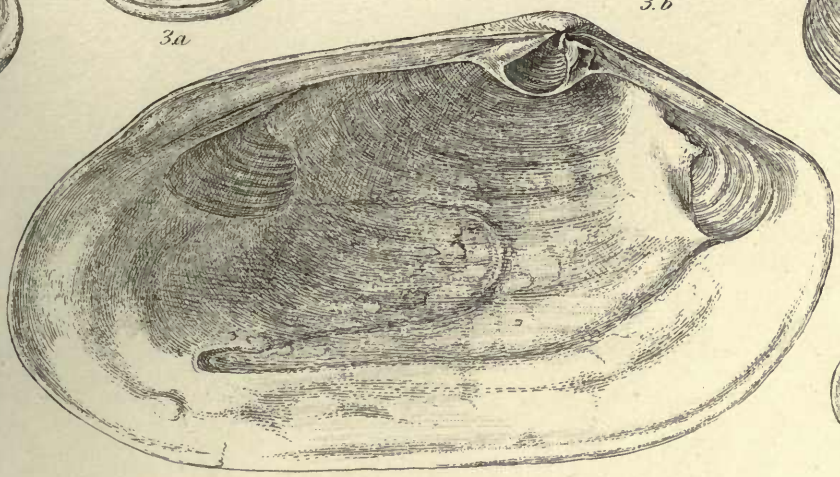


3.a

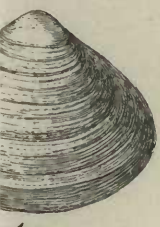
3.b



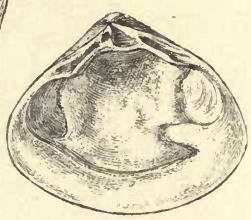
2.b



1.a

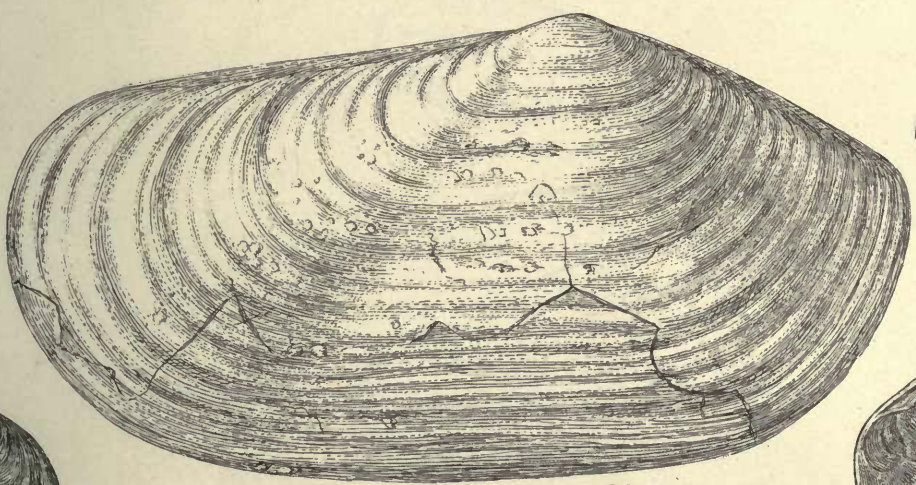


4.a



4.b

5.a

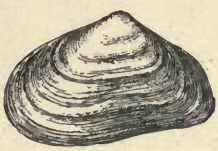


1.b

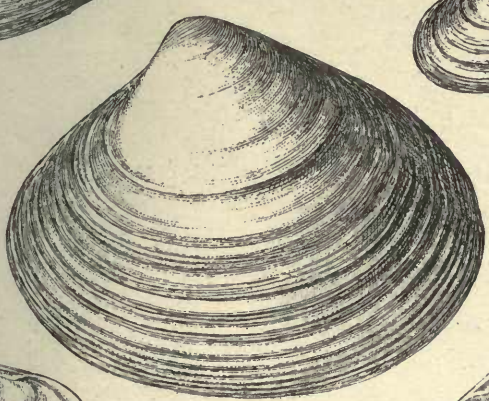
5.b

6.a

6.b



6.c



8.a

8.b

7.a

4.c

7.b

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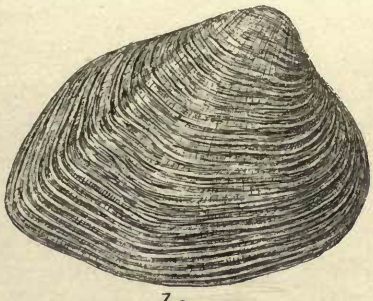
TAB. XXV.

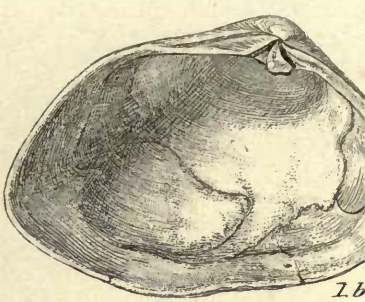
Fig.

1. Gastrana laminosa, p. 217. From Coralline Crag, Sudbourne.
   d, *e*, specimen distorted. From Red Crag, Walton Naze.
2. Cultellus tenuis, p. 258. From Red Crag, Walton Naze.
   c, *d*, hinge of both valves slightly enlarged.
3. Macha strigillata, p. 252. From Coralline Crag, Sutton.
4. Pandora Pinna, p. 270.
5. Pandora inæquivalvis, p. 270.
6. Solen ensis, p. 256. From Red Crag, Walton Naze.
   a—*d*, various specimens showing different proportionate dimensions.
   e, *f*, exhibit muscular impressions.
7. Solen siliqua, p. 255. From Red Crag, Sutton.
   b, *d*, interior view, to show difference in muscular impressions.
   c, a small elongated specimen, with valves united.
8. Solen gladiolus, p. 254. From Red Crag, Walton Naze.*

* In support of the presumption assumed in the note at page 255, that the Red Crag is not wholly derivative, it may be further remarked, that at the part of the cliff whence this specimen was obtained, there are no extraneous fossils whatever, at least none that I have been able to discover, which could be *decidedly* said were foreign to the deposit. The shells here rest immediately upon the London Clay, and are in the highest state of perfection; not only are there many Bivalves in their natural position, but the numerous specimens of the reversed variety of *Trophon antiquum* have the fragile apex or pullus seldom or never removed. Many species are also found that are not met with in the Coralline Crag; though this latter evidence is not of itself conclusive, it helps to sustain the argument deduced from the perfection of the specimens. The whole aspect of the Fauna at this locality differs from that of the White or Coralline Crag; the same also may be said of its lithological character, and, in my opinion, the probabilities are greatly in favour of the Red Crag, certainly at Walton-on-the-Naze, being pure and genuine, and of an Age geologically subsequent to the Coralline Crag.

1.a


1.c

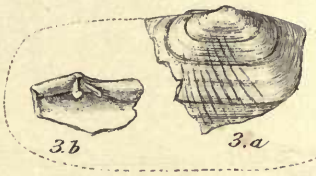

1.b

c

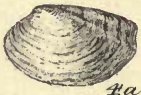
d

1.d

1.e

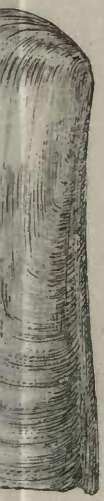

3.b
3.a

6.a


4.a

5

6.b



8.c

6.c

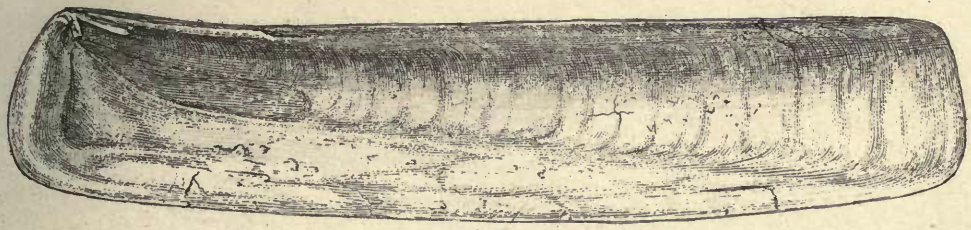
5.c

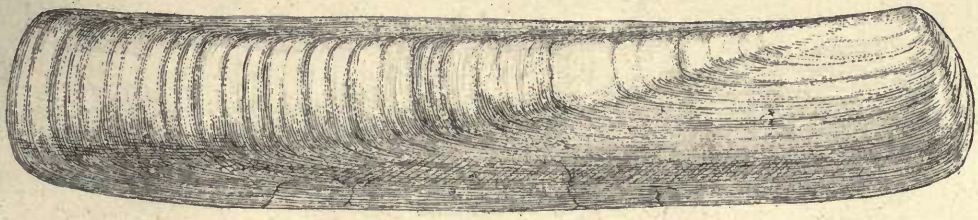
7.e

5.f

6.d

b


8.a


8.b

7.d

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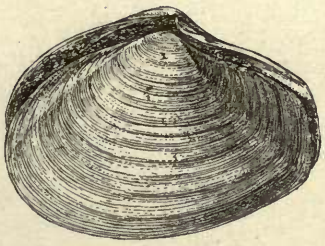
TAB. XXVI.

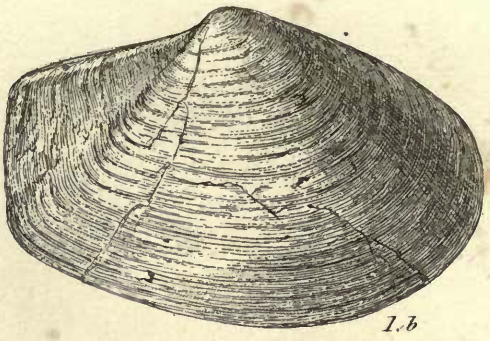
Fig.

1. Thracia pubescens, p. 259. From Coralline Crag, Sudbourne.
   e, a distorted specimen, probably the young of this species. (Thracia detruncata, *S. Wood.* 'Catalogue of Crag Shells.')
2. Thracia phaseolina, p. 260. From Coralline Crag, Sutton.
   c, a short *var.*, or perhaps the young of pubescens.
3. Cochlodesma complanatum, p. 263. From Red Crag, Walton Naze.
4. Cochlodesma prætenerum, p. 264. From Coralline Crag, Sutton.
5. Thracia ventricosa, p. 262. ,, Ramsholt.
6. Thracia inflata, p. 261. ,, Sudbourne.

1.a

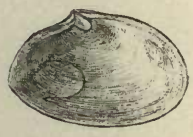


1.d



1.b

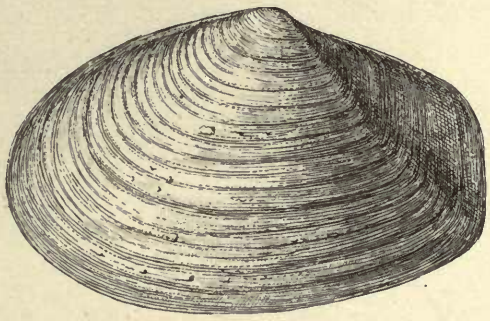
a



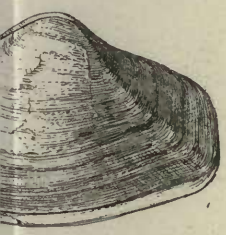
3.b

4.a

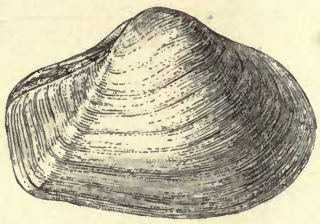
4.b



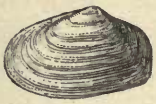
1.c



5.a



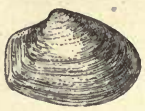
5.b



2.a

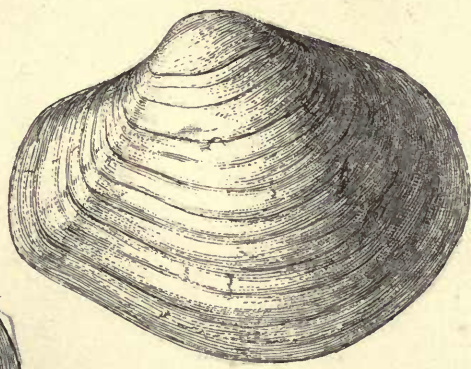
2.b

1.e

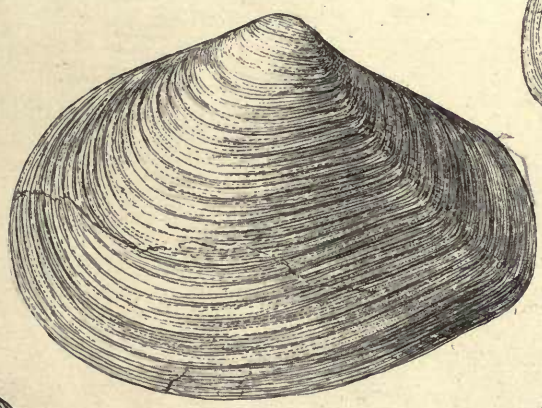


2.c

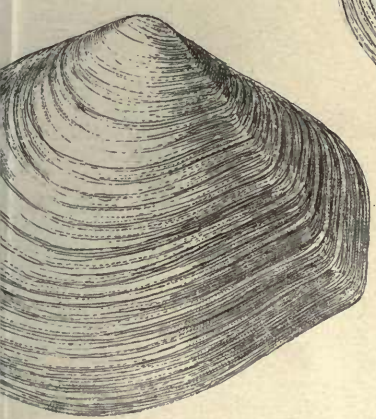
6.a



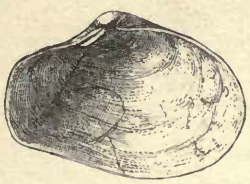
6.b



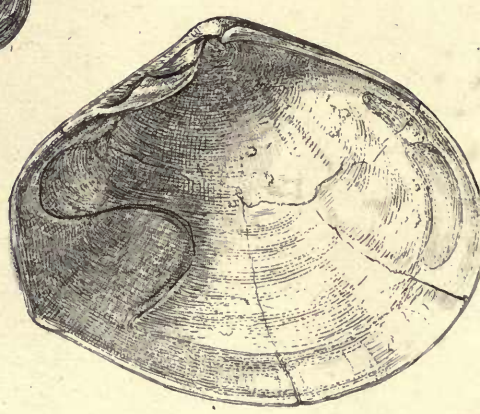
6.c



6.d



5.c



6.e

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TAB. XXVII.

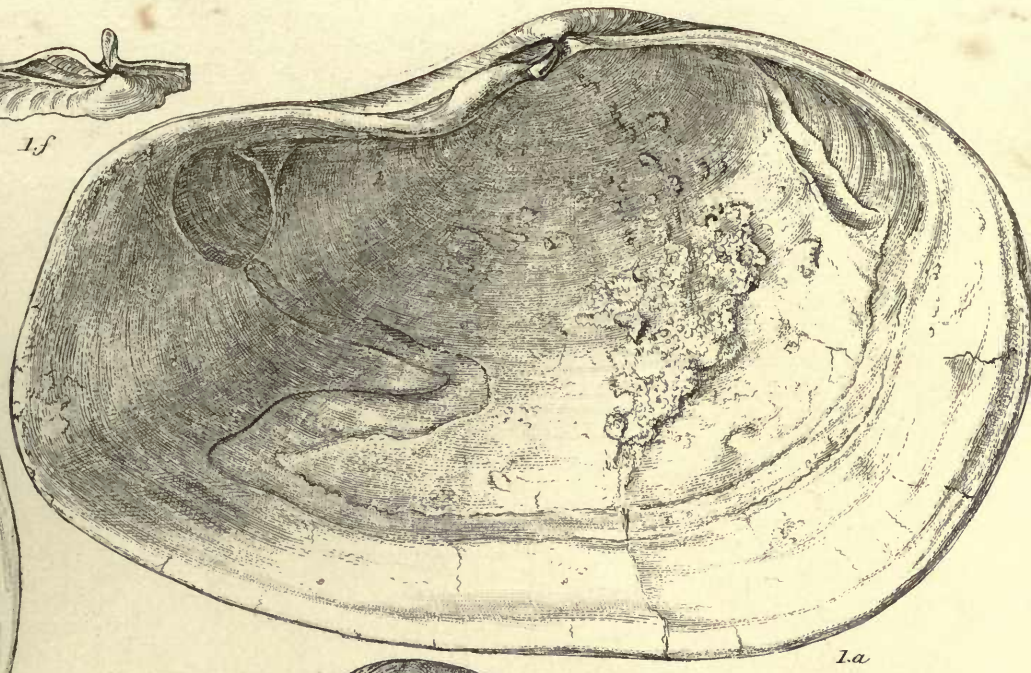
Panopea Faujasii, p. 283.

a, b, c, from the Coralline Crag, Sudbourne.

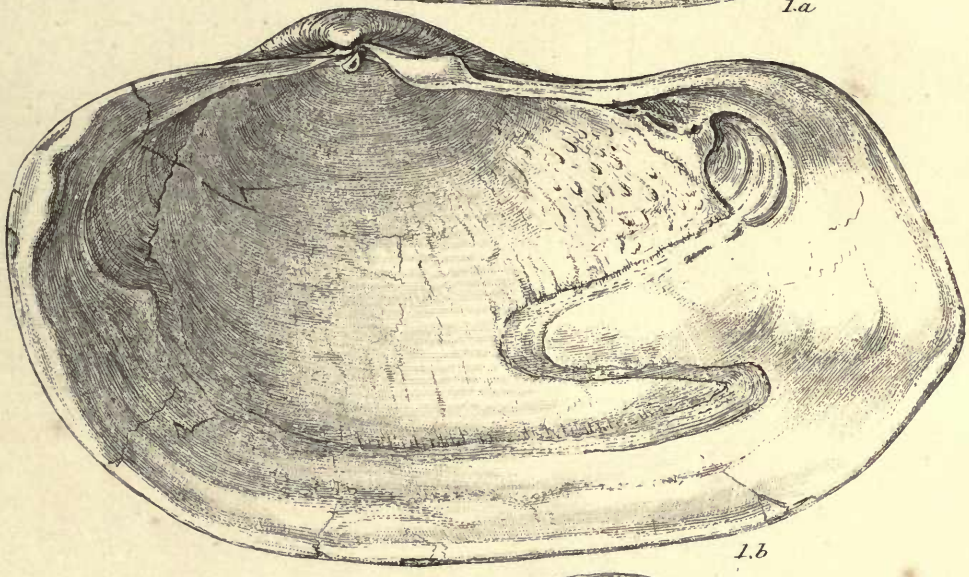
d, e, var. gentilis. From the Red Crag.

1.d

1.f

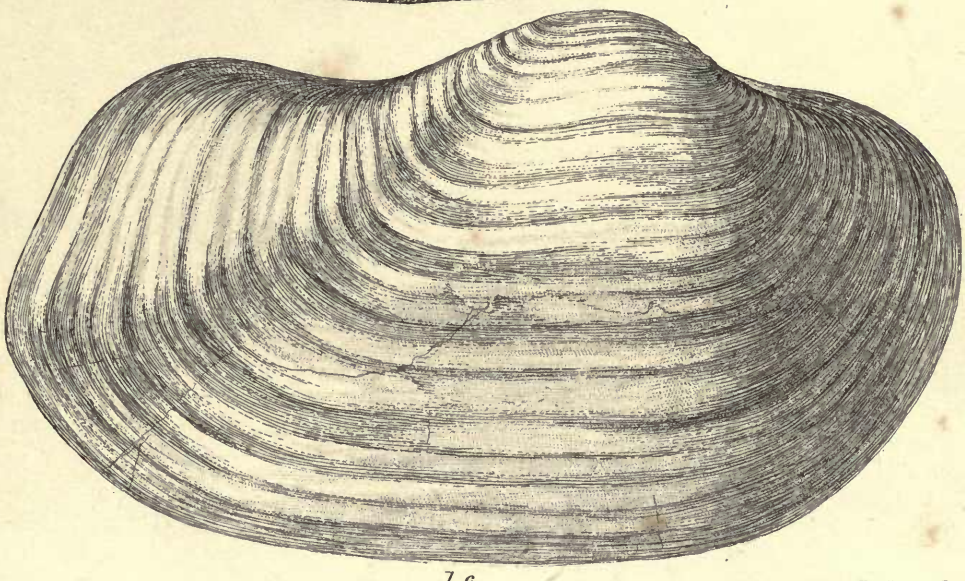


1.a



1.b

1.e



1.c

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TAB. XXVIII.

Fig.

1. Mya truncata, p. 277.

a, *b*, from Coralline Crag, at Ramsholt.

c, *var.* Uddevallensis. From the Clyde Beds.

d, *e*, *var.* pullus. From the Red Crag, at Butley.

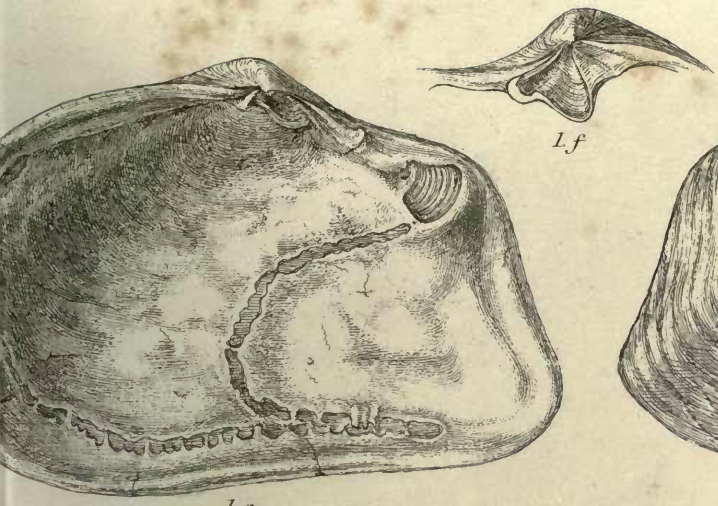
2. Mya arenaria, p. 279.

a, *b*, from the Red Crag, Sutton.

d, *e*, *var.* lata. From the Red Crag, Sutton.

c, distorted specimen, from the Mammaliferous Crag, Bramerton.

f, cartilage plate of *var.* lata.



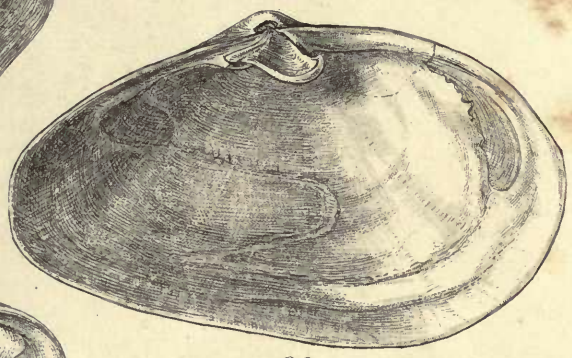
1.a

1.f

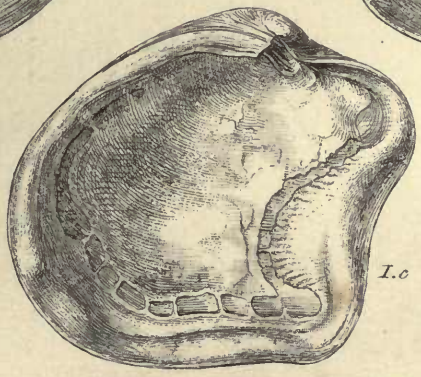
1.b

2.c

2.a



2.b

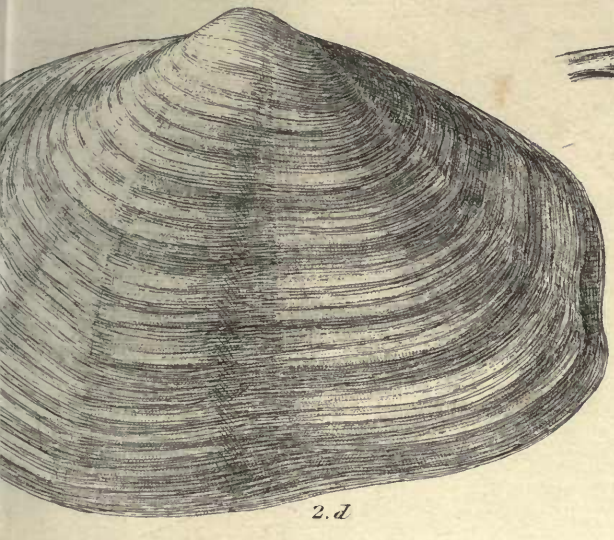


1.c

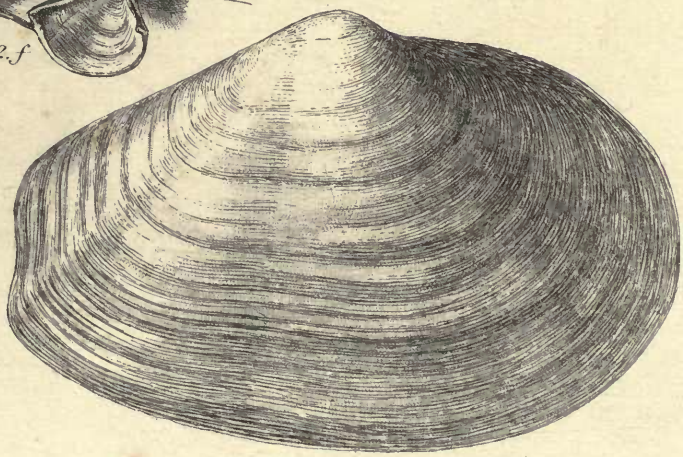
1.d

1.e

2.f



2.d



2.e

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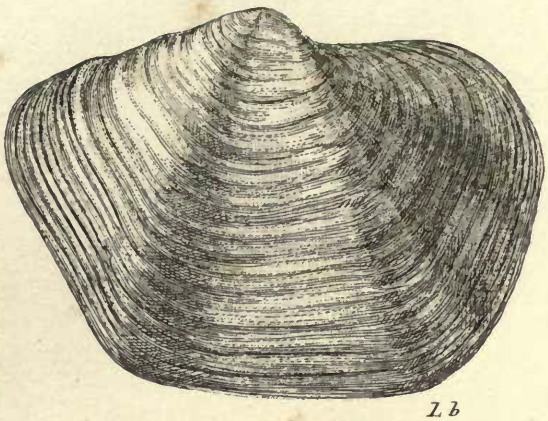
TAB. XXIX.

Fig.

1. Panopea Norvegica, p. 281.
   a, *b*, *d*, specimens from Chillesford, showing the siphonal side considerably the shorter of the two.
   c, specimen from the Red Crag, Sutton, siphonal side the larger.
2. Glycimeris angusta, p. 291.
   a, *c*, *d*, from the Coralline Crag, Sudbourne.
   b, specimen rather more elongated, and less twisted, from the Red Crag, Sutton.
3. Saxicava rugosa, p. 285.
   a, *b*, *var.* sulcata. Bridlington.
   e, *var.* rustica. Valves united; from the Red Crag, Sutton.
   f, *var.* distorta. Coralline Crag, Sutton.
   g, *var.* cylindrica. Red Crag, Butley.
4. Saxicava arctica, p. 287.
   a, (Mytilus præcisus, *Mont.*) Coralline Crag, Sutton.
   b, (Solen minutus, *Mont.*) ,, ,,
   c, (Agina purpurea, *Turt.*) ,, ,,
5. Saxicava ? carinata ? p. 289. ,, ,,
   a—*d*, figures enlarged; *e*, natural size.
6. Saxicava ? fragilis, p. 288. Coralline Crag, Sutton.
   a—*d*, figures enlarged; *e*, natural size.
7. Sphenia ? Binghami ? p. 276. Figure enlarged. Coralline Crag, Sutton.

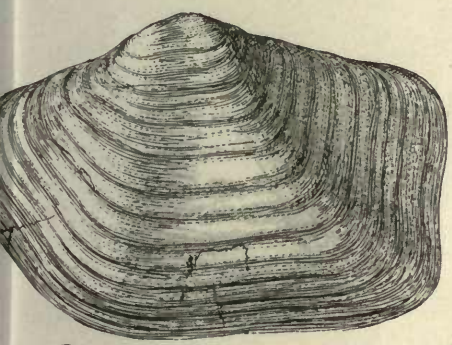
1.a

1.c

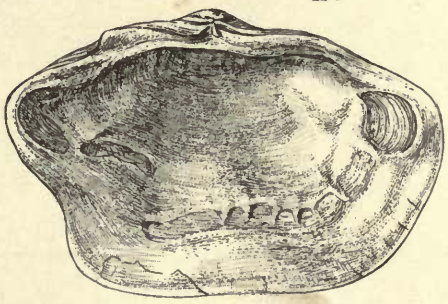


1.b

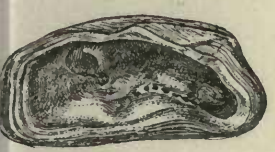
1.e



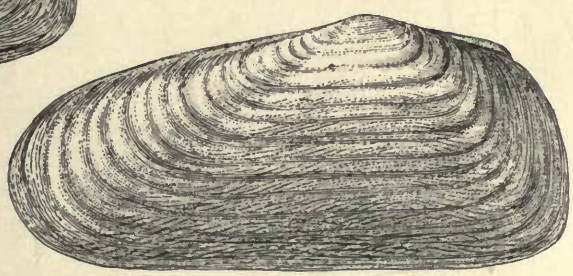
1.c



1.d



3.a



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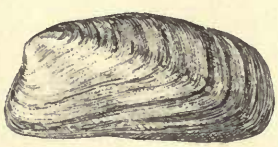


3.b

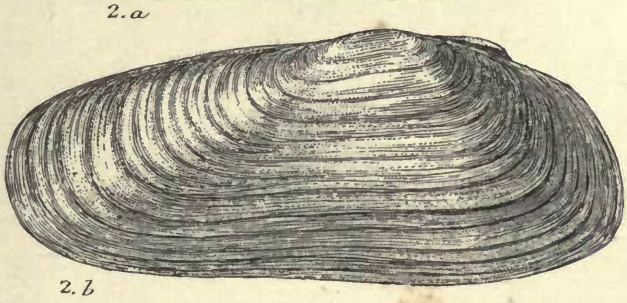
5.a

5.e

5.b

5.c

5.d



2.b

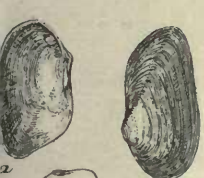
4.a

4.b

2.c

3.e

3.f



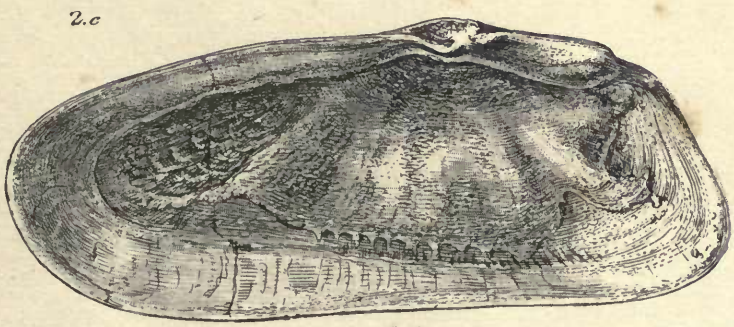
6.a

6.b

6.e

6.c

6.d



2.d

7

3.g

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TAB. XXX.

Fig.

1. Pholadomya hesterna, p. 266. From Coralline Crag, Ramsholt.
   c, hinge; *d*, portion of shell magnified to show the granulated or shagreen surface.
2. Corbula complanata, p. 275. From Red Crag, Sutton.
3. Corbula striata, p. 274. From Coralline Crag, Sutton.
4. Corbula rosea? p. 275. ,, ,,
5. Poromya granulata, p. 268. ,, ,,
   e, *f*, hinge of both valves magnified, to show the fosse for internal ligament.
6. Neæra cuspidata, p. 273. A fragment only. The outline is imaginary. From Coralline Crag, Sutton.
7. Neæra jugosa, p. 272. The line denotes the natural size. From Coralline Crag, Sutton.
8. Pholas cylindrica, p. 295. From Red Crag, Walton Naze.
   d, accessory valve, probably of this species.
9. Pholas crispata, p. 296. From Red Crag, Walton Naze.
10. Pholadidea papyracea, p. 298. Figured from two fragments connected by an outline. From Coralline Crag, Sutton.
11. Gastrochæna dubia, p. 292. From Coralline Crag, Sutton.
    c, incrassated portion of the neck of its flask-like envelope.
    d, represents the siphonal apertures.
12. Teredo Norvagica, p. 300. From Coralline Crag, Sutton.
    c, posterior portion of tube, showing camerated partitions.
    d, fragment of a thick tube; natural size.

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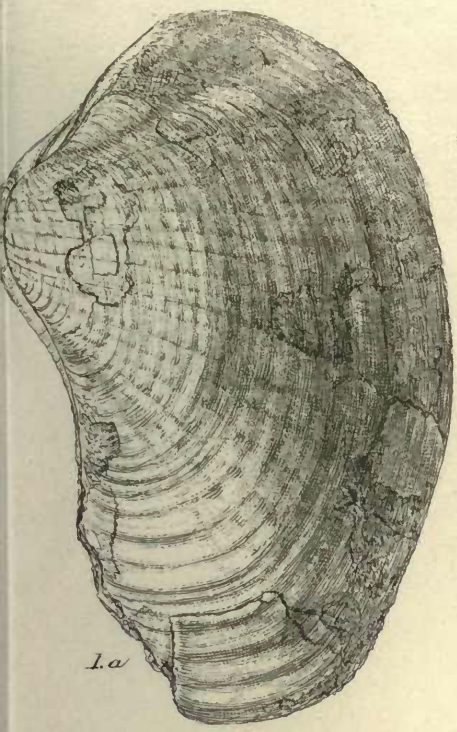
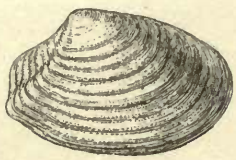

1.a

2.a

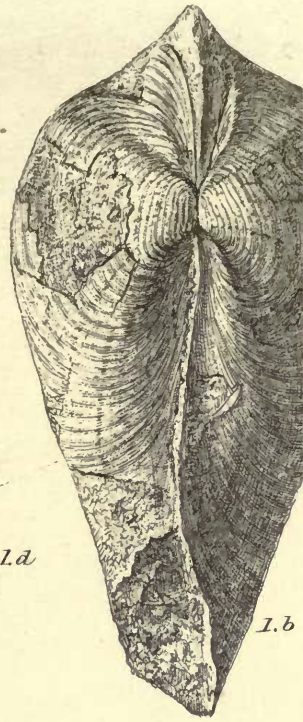

2.b

2.c

2.d

1.c

1.d


1.b

5.a

5.b

5.e

5.f

5.c

5.d

12.d

3.a

3.b

3.c

3.d

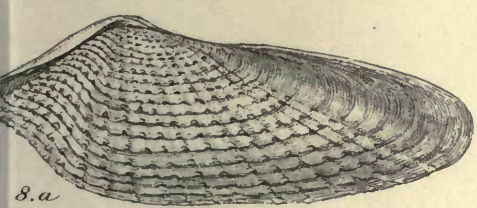
8.d

4

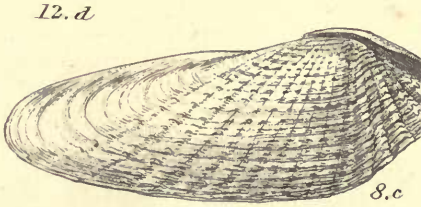
7.

6

7.b


8.a

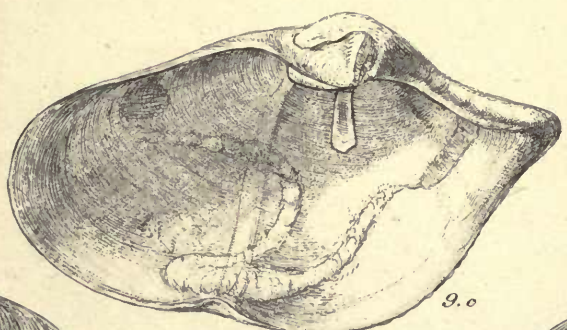
8.b


8.c

11.a

11.b

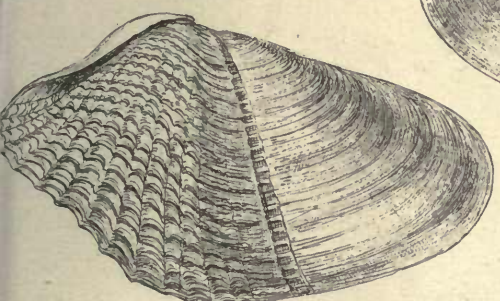
11.c


9.c

12.c

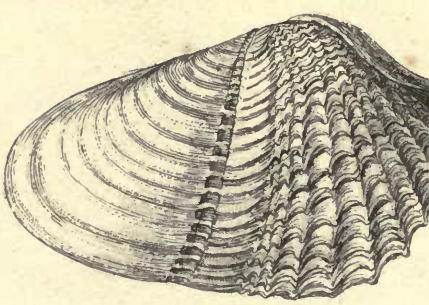
12.a

12.b


9.a

11.d

10


9.b

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APPENDIX. TAB. XXXI.

Fig.		Page
1.	Trophon Norvegicum	312
2.	Trophon Turtoni	312
3.	Trophon propinquum? *b*, apex enlarged.	313
4.	Trophon Fabricii	313
5.	Nassa pygmæa	315
6.	Pyrula acclinis *b*, a portion of the matrix, with impression of the exterior surface.	311
7.	Mitra ebenus, nat. size	310
8.	Mitra plicifera	311
9.	Cancellaria scalaroïdes	316
10.	Rissoa soluta	318
11.	Odostomia unidentata	317
12.	Rissoa Thermalis? *b*, apex enlarged.	319
13, *a*, *b*.	Lacuna vincta	316
14, *a*, *b*.	Jeffreysia? patula	319
15, *a*, *b*.	Helix ruderata	309
16.	Odostomia truncatula?	318
17, *a*, *b*.	Helix incarnata	309
18, *a*, *b*.	Paludina marginata	320
19, *a*, *b*.	Helix fruticum	308
20.	Pecten polymorphus	323
21.	Mactra triangulata *d*, hinge of right valve enlarged. *a*, exterior slightly enlarged to show regularity of ridges.	324
22.	Helix arbustorum	306
23.	Pholadidea	325
24.	Aplysia? asciola *a*, *b*, outside and inside views.	322
25.	Pecten maximus *var*. larvatus. outside view of flat valve.	323
26.	Lutraria rugosa *a*, inside view of left valve. *b*, outside view of right valve.	325

Note. The lines denote the size of specimens.

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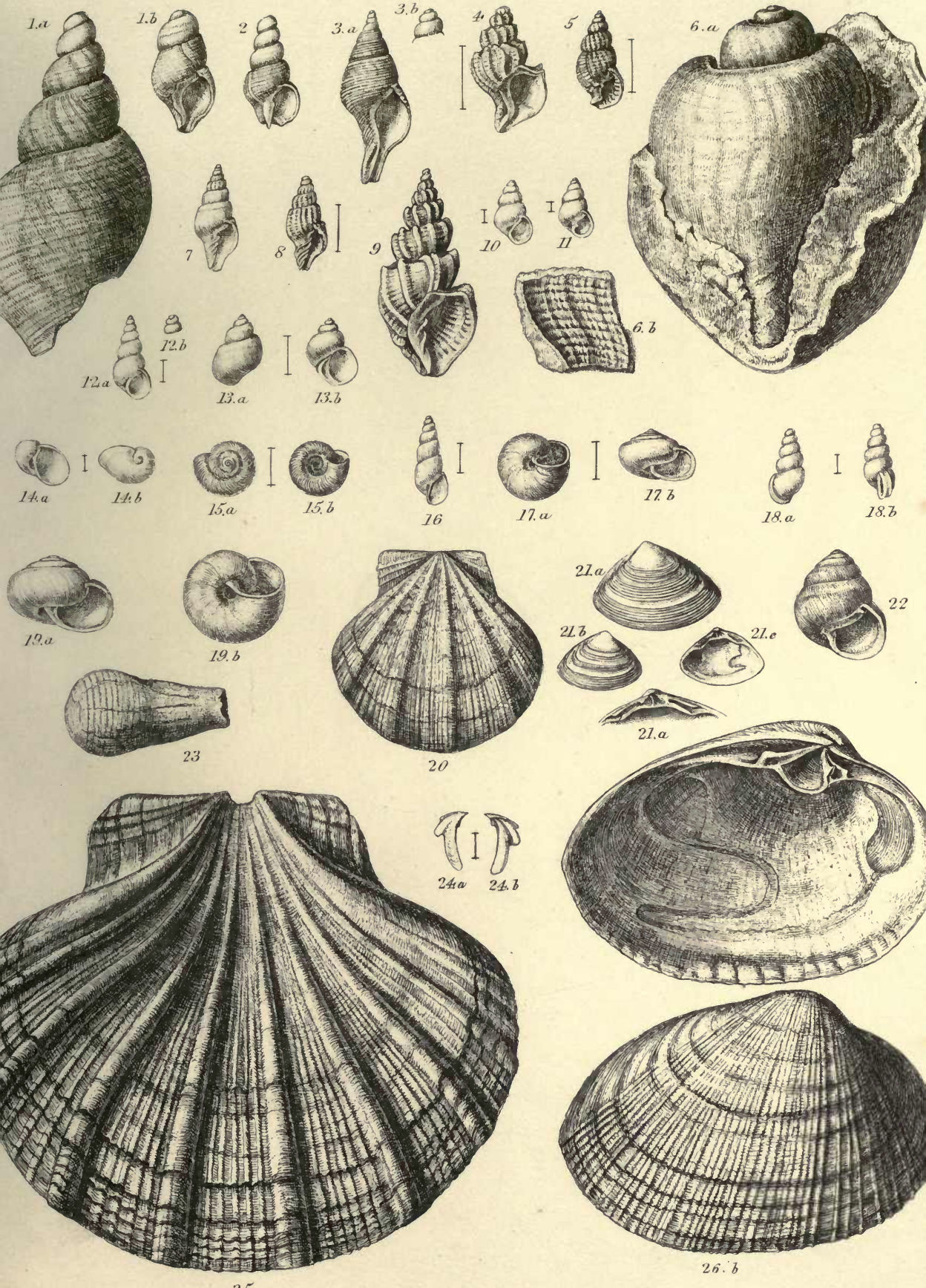
1.a
1.b
2
3.a
3.b
4
5
6.a
7
8
9
10
11
6.b
12.a
12.b
13.a
13.b
14.a
14.b
15.a
15.b
16
17.a
17.b
18.a
18.b
19.a
19.b
20
21.a
21.b
21.c
21.a
22
23
24.a
24.b
25
26.b

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